The Earth Science DIGEST

35¢

March, 1953

The Earth Science Digest

A MAGAZINE DEVOTED TO THE EARTH SCIENCES

Volume 6 **March, 1953** **Number 5**

IN THIS ISSUE

Communications for editorial consideration should be sent to the Editor, B. J. Babbitt, 140 Northgate Rd., Riverside, Ill.

• Published bi-monthly by The Earth Science Publishing Co., [Inc.], Box 1357, Chicago 90, Illinois • Subscriptions: U.S. and possessions and Canada, $2.00 per year. Other countries, $2.50 per year • The Earth Science Digest is the official publication of the Midwest Federation of Mineralogical Societies and of the Eastern Federation of Mineralogical and Lapidary Societies (subject to approval at its annual convention). • The Earth Science Digest is open to articles of earth science interest. No manuscripts, photographs, sketches will be returned unless accompanied by ample first-class postage.

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Roses That Are Rocks

The article in the November 1952 issue of Earth Science Digest was and is of particular interest to this present writer. For some time said person has been an admirer of Mrs. Zeitner's informative readable narratives, and has followed the peregrinations of the Zeitners with enjoyment, and perhaps somewhat of envy. "And now," as the radio man says, "Rattlesnake Butte, South Dakota, hits me right where I am currently most interested."

How come? In June 1951, on the bleak shore of the Arctic Ocean, in that part of Alaska that lies closest to Siberia, I stumbled onto some sand calcites that were eye openers and heart thrillers. As fine specimens of these crystal aggregates occur but sparingly in that particular locality, a great deal of my time and not a little folding money have been spent since their discovery trying to find out if they occur elsewhere along the Arctic Ocean littoral in Alaska, and in encouraging the residents of Cape Prince of Wales, Shishmaref and Cape Espenberg to search for these curious growths from under the chilly Arctic Sea.

Elsewhere the sand calcites from South Dakota have been written of as pseudomorphs after calcite. That may be correct. But in this writer's lay opinion, these Alaskan concretions are original calcite crystals which have formed in a sand matrix, and in the process of growth have included particles from their maxtrix in the space within their boundaries. This hypothesis may be borne out by the fact that the terminations of the crystals, when of an amber or dark honey color, are subtranslucent.

I am not versed in crystallography—just an unlettered person, who for "nigh onto" sixty years has found prospecting a quite unremunerative vocation, but a most satisfying avocation. It is a matter of common knowledge, however, that calcite is a most versatile mineral as regards the patterns of its crystals. This is strikingly so as regards these Alaska calcites. Perhaps the most frequent habit of growth is the rosette of tiny flattened scalenohedrons arranged radially or concentrically, and with symmetry, forming beautiful simulations of roses, pom pom "mums" and other multipetaled flowers.

Other aggregates of crystals are often of a pleasing asymmetry. These include stars, crosses, spear points, cockscombs, sunbursts, medallions and clusters of joined tiny rosettes. Sometimes an oval or rounded "pebble" of the indurated matrix will have crystals projecting to closely resemble a chicken or other animal or common object. Scalenohedrons seem to occur in all the types of aggregates, as do other rhombic forms, and as well, tabular, acicular and prismatic growths. Any of the crystal forms may mother a host of lesser crystals which have formed at any and all angles from the parent. This is especially so in an unusually elongated four sided pyramidal form which might be described as quadrahedral.

I consider that these Alaska calcites will primarily interest the amateur lover of the odd and beautiful, but I am hopeful that competent persons will study them with the spectroscope and the polarizing microscope.

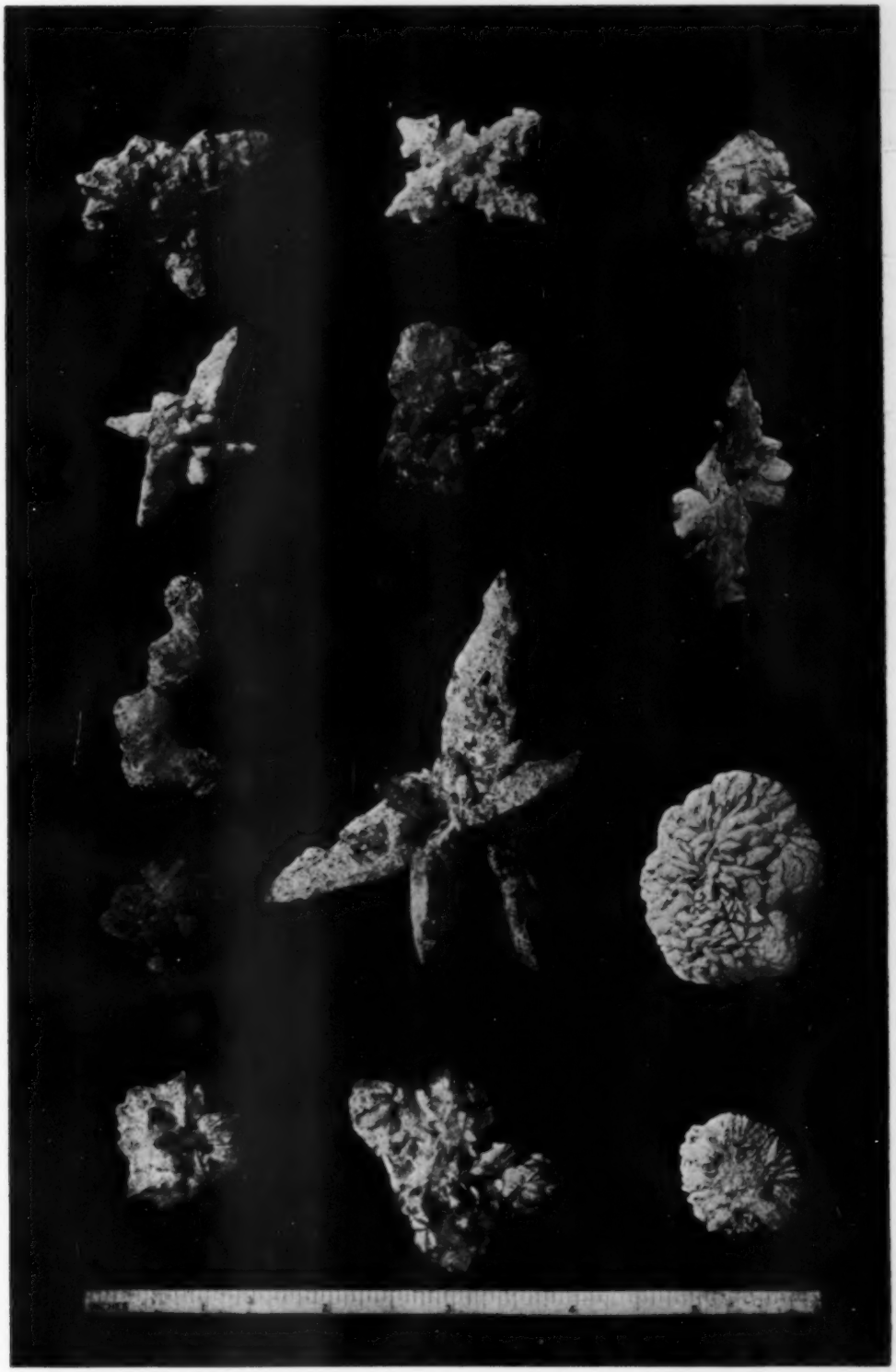
Adverting to Mrs. Zeitner's article, the splendidly reproduced photograph of Mr. and Mrs. Albert Zeitner adds much to the interest of the narrative, as does the sketch of the locality for those so fortunate as to live Stateside. Personally, it is hoped that a future article will include a pen picture, at least, of "Dad" Zeitner. I'll wager he has been a Black Hills Prospector.

Good diggins folks!

FRANK H. WASKEY
Dillingham, Alaska

* * *

Photo on opposite page. Also see Exotic Crystal Forms, page 37.



Serpentine, Chromite in Maryland

by Leslie E. Mihm
Baltimore, Maryland

The serpentines of Maryland are found in a variety of forms, and are of considerable commercial value. They are here described in reverse order of their importance from the standpoint of the collector and gem-cutter.

The commonest form of serpentine is quarried for building material and road and railroad rock-ballast. For building purposes it is known as "greenstone," and in the mass has a soft, greenish gray appearance. Specimens show tiny veins of yellow, red, blue and purple. Various forms of serpentine are taken from several active quarries near Baltimore, including gem-quality williamsite, baltimorite and picrolite, and are indiscriminately crushed up with rap rock for road building purposes.

In the next category is verdantique marble, which is not a true marble at all, but a metamorphic serpentine rock. This material is currently being quarried by the Cardiff Green Marble Company, in Hartford County, Maryland. The company has a modern, efficient operation, where the stone is quarried in large blocks that are gang sawed into slabs and polished for commercial use as store fronts, bank counters and decorative trim, soda fountains, bases for monuments, ornaments, etc. It is an opaque stone, capable of taking a high polish, of a dark green mottled color, variegated with long wavy snake-like white veins —hence the name "serpentine"—and is much esteemed as trim for its contrast with the pale colors of the pale marbles.

In baltimorite, usually of a light bluish-green color, the serpentine begins to exhibit a folded or fibrous character, and has no value except as a curiosity to the collector. It occurs where nearly all the other varieties of serpentine are to be found, as does also picrolite.

Picrolite is a rare variety of serpentine that shows foliated and fibrous characteristics to a marked degree. Usually of a dull, bluish-green color, it somewhat resembles asbestos, save that the long, slender crystals are hard and brittle and do not possess the silky sheen of asbestos. The crystals run parallel and frequently are terminated in a short arc or compound curve, and are separable like the fibers of a brush. It is frequently mistaken for petrified wood.

Another beautiful form because of its common ancestry and association with the serpentines is brucite, which is found at the historically famous Wood Mine in Lancaster County, Pennsylvania, just across the Maryland State Line. This mineral has the same general fibrous, foliated characteristics as picrolite, with the crystals also running to arcs and compound curves. It is of a general silvery white appearance, with alternate inclusions of green serpentine and light red, probably from cinnabar, which is found in this region.

A still different form of serpentine has turned up recently in the Blue Mount quarry in serpentized trap rock at White Hall, Baltimore County. This is a light, translucent mineral, green in color, with minute integrated crystals resembling "sugar quartz." No one seems to understand it.

We come now to the premier form of serpentine, williamsite, which is of gem quality. This is the famous translucent, jade-like serpentine, which is closely associated with the chrome ore of commerce. The finest specimens of this stone have come from the State Line Chrome Pits of Cecil County, Maryland, located several miles northeast of Conowingo on the Susquehanna River. The chrome ore was found in seams very much like deposits of coal, overlain or commingled with the ser-

pentine. The williamsite, because of its low content of chromite, was discarded as refuse, and was often used to grade the roads leading to the mines. The State Line Pits were in the nature of test holes and trenches to determine the general drift of the main ore body of chromite, but the refuse heaps from these pits have yielded the best gem williamsite found thus far. Obviously we are indebted to the pioneer industrial impetus of the old disused chrome mines for the production and current supply of williamsite.

up with the commercial chrome industry, it might be interesting to trace briefly the history of that industry in Maryland. There are several versions of the original finding and identification of the chrome ore in Maryland. One is that it was first found on the estate of Jesse Tyson at Bare Hills, on the outskirts of Baltimore, and identified by his English gardener, a Mr. Henfrey, sometime prior to 1833. There are still evidences of these workings at Bare Hills, but the family estate of the Tyson's is at Cylburn, several miles

1. Soldier's Delight Serpentine Barrens
   Dyer Serpentine Quarry
   Chote Chrome Mine
2. Cardiff Green Marble Co.
3. Wood Mine, Lancaster Co., Pa.
4. White Hall Trap Rock Quarry
5. State Line Chrome Pits
6. Bare Hills Chrome Mines
7. Reed Chrome Mine, Jarrettsville
8. Elkton Cecil Co.,
9. Wood Mine, Octorora
10. Catoctin Mountain
11. Etchison Chrome Mine

Map showing Serpentine and Chromite Deposits in Maryland.
Base Map Courtesy of Rand McNally & Company

It is a curious commentary that no one seems to have recognized or appreciated the beauty of this gem stone until recent years. The writer believes that he has the distinction of being the first person to cut this material as a gem stone.

Since this gem is so closely bound south of Bare Hills, and the serpentine barrens of Bare Hills are so infertile and desolate that they are inhabited only by Negroes. A small quarry there has recently produced the "greenstone" heretofore mentioned, for building purposes.

Another version has it that Tyson,

in 1827, saw in Belair Market, Baltimore, a cart containing a cider barrel held from rolling by some heavy black stones which he recognized to be chromite. The site of the stones was traced to what became the location of the Reed Mine near Jarrettsville, Harford County, Maryland. The property was owned by the Reed family, but the mine was operated under lease by the Tyson Mining Company. This mine produced 100,000 tons of chromite, making it the second largest chrome ore producer in the United States at the time.

The following year, Tyson, having noticed that the chromite was confined to serpentine rock, the occurrence of which could be predicted by the "barrens" produced in regions underlain by it, in following out serpentine areas, discovered chromite in the State Line Serpentine Area. The point at which the discovery was made was on the Wood Farm, later the site of the Wood Mine. This deposit was opened in 1828, and the property was purchased outright by Tyson in 1832.

The Tyson family of Baltimore at one time controlled the world's supply of chrome ore from its various mines in Maryland. The ore was shipped principally to England for the manufacture of paint pigment, the standard "chrome yellow." The commercial use of chrome as a metal had not yet become general, although as early as 1797 Nicholas Vauquelin, a French chemist, had converted crocoite, a form of chrome ore, into the metal.

Mr. Curtis O. Tyson, a direct descendant of the founders of the Tyson chrome empire, gives the following account of the origin of this business in Maryland. His grandfather was a farmer in Cecil County, engaged principally in growing potatoes near the site of the State Line Chrome Pits. They were accustomed to transport these potatoes to market in Baltimore in the large Conestoga wagons or "Prairie Schooners" common to the day, and in the wagon-box they carried a number of large stones, from the local terrain to "chock" the wheels of the wagons on the grades so that the horses could have a breather. One day while stopped on one of these grades, a prospector approached them, noticed the stones used as "chocks" for the wheels, inquired if there was any more of this material to be had. Upon learning that the stones were plentiful, a deal was thereupon entered into with the Tyson's to load a vessel at Elkton (at that time an active port) with the stones for a price agreed upon. According to Mr. Curtis O. Tyson they did not even know what they were shipping other than that they were stones, nor the destination of the vessel. Such, according to his version, was the beginning of the Tyson chrome fortune, and an industry which extended across nearly the entire state of Maryland. Mr. Tyson is a retired lawyer who owns a number of parcels of land in Maryland which he is now engaged in developing for their natural resources, other than chrome ore.

The discovery of large deposits of chrome ore in Turkey, and the failure to exploit with scientific accuracy the drift of the chrome ore body in Maryland, particularly in the vicinity of the Wood Mine, brought about the eclipse of the chrome industry in Maryland and the United States, and the abandonment of our known sources of supply. Today, chrome is on our list of strategic minerals, both for the production of steel and other chrome alloys.

The vicinity of the famous Wood Mine would still seem to be the best potential source of chrome mining operations in the state of Maryland, for the purpose of the local supply of that strategic mineral, and for stock-piling against the possible removal of this source from the supply of foreign deposits.

An interesting article on the site of the Wood Mine, by L. J. Duersmith, appeared in the May-June, 1951, issue of the "Rocks and Minerals" magazine at page 243, complete with maps, speedometer readings and photographs. The photographs were authentic as to the location of the dumps and other points

(*Continued on Page* 44)

Atomic Research at Argonne National Laboratory

by Robt. B. Laraway

In the rolling hills of southern DuPage county, about 15 miles north of Joliet, a group of red brick buildings occupies what once was farm land.

To a casual observer, they look like the lecture halls and laboratories of any medium sized mid-west university. They even bear the same names—Chemistry, Physics, Chemical Engineering and so on.

But there the similarity ends. As is attested by the high fence surrounding the campus-like setting, broken only by small houses occupied by uniformed guards, these buildings are important—awfully important.

They comprise the new area of the Argonne National Laboratory where some of America's greatest scientists are working with feverish haste to insure the continued dominance of this nation in the field of atomic energy.

The Argonne Laboratory has had two locations since its inception in January of 1942 when it was known as the metallurgical laboratory of the University of Chicago. Under its first name, when it was located in buildings on the Midway in Chicago, and in laboratories in the Palos Park forest preserve area, it was the scene of the greatest scientific discovery of the age. It was here that scientists accomplished the first controlled fission of the uranium atom.

As time went on, it became more apparent that the operations of the laboratory must be widened. After exhaustive study, the DuPage county site was selected. Here the laboratory is housed in a series of quonset type buildings and the newer brick structures.

The best architectural minds in the nation combined to design the new laboratories. The type of work to be accomplished in the labs was taken into consideration; the demands of the men who would use them were studied; and the accumulated knowledge of methods of protecting these men and the surrounding countryside from radio-active wastes were incorporated in their design.

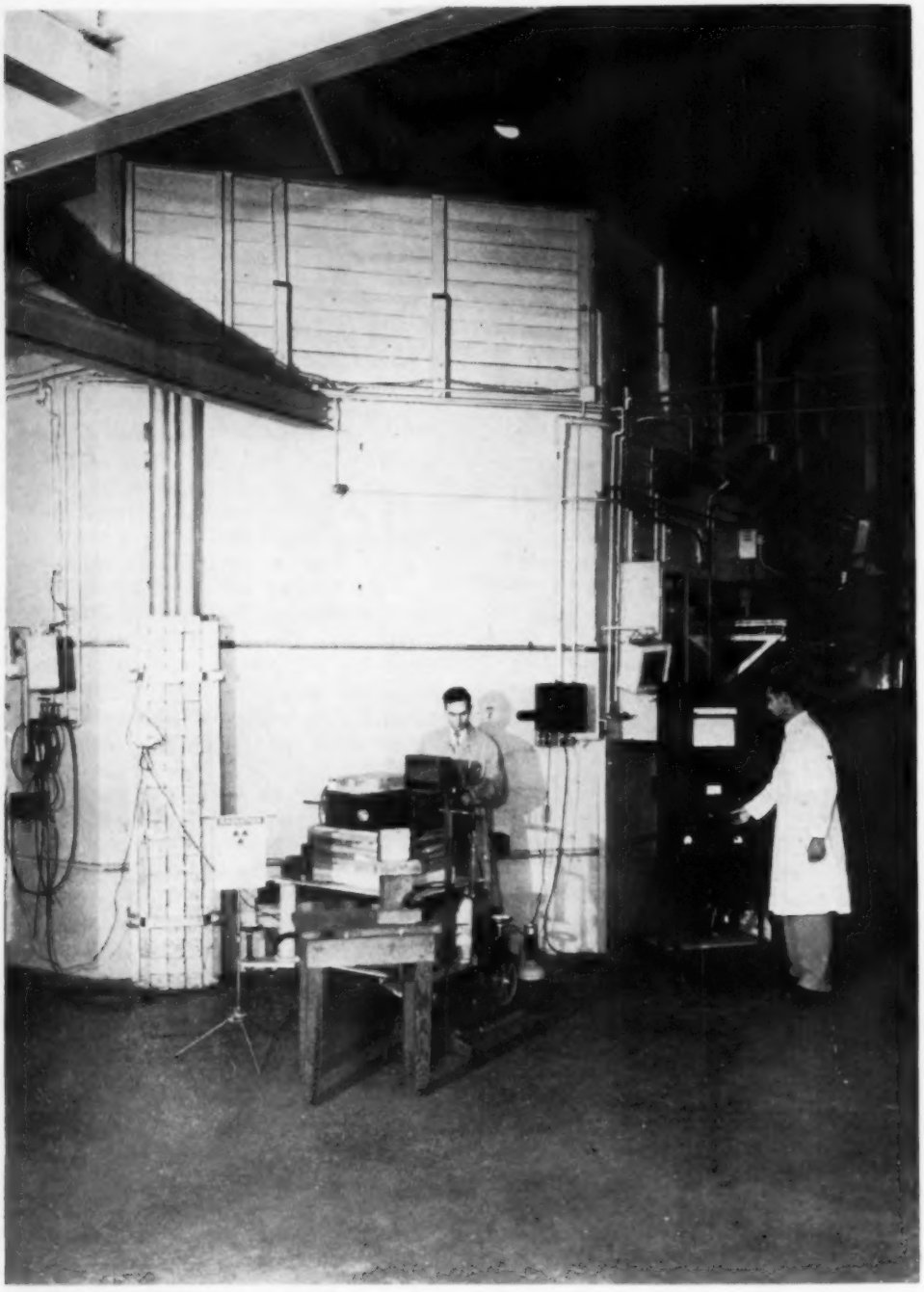
From the exterior, the buildings are all of a similar red brick, modern construction. Inside, they are a scientist's dream.

Typical of them is the $8,000,000 chemistry building which was occupied last August. Across the front and rear of the structure are two curved hallways, each more than a city block in length. The curvature was made to avoid the feeling of walls closing in so often associated with long, narrow structures. These hallways are connected by six laboratory wings, each almost the length of a city block. The building covers 278,000 square feet.

Each wing contains a hall with laboratories located on one side and offices on the other. In all, there are almost 100 labs and an equal number of offices in the structure.

A few of the precautions taken to protect not only the men working in the lab, but also residents of the surrounding areas show the care with which the buildings were designed and built.

The method of ventilation is significant. All air is drawn into the office side of each wing. The air pressure in the offices is kept higher than that in the hall and similarly the pressure in the hall is higher than that in the laboratory side. Thus, the air enters on the office side and flows thru the hall and into the labs where it is exhausted thru vents. By this arrangement, no radio-active material can be carried by air circulation back into the building. The air exhaust vents each lead into traps, where any radioactive material is caught before it can go out into the atmosphere.

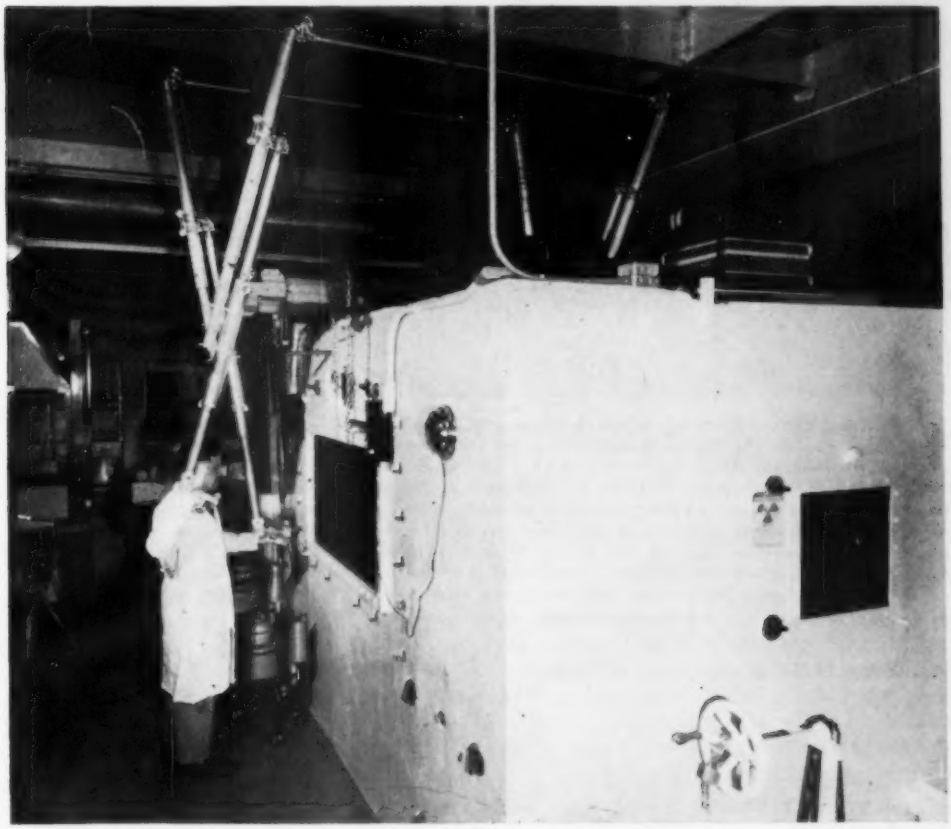


Shown is a general view of Argonne National Laboratory's heavy water moderated nuclear reactor. The reactor core consists of a tank of heavy water in which uranium rods are suspended. Neutrons created in the fission process are utilized in numerous studies by Argonne's scientists, as shown in the foreground. To reflect the neutrons back into the uranium section of the reactor, a two feet thick wall of graphite surrounds the reactor core. An eight feet thick concrete shield surrounds the entire assembly.

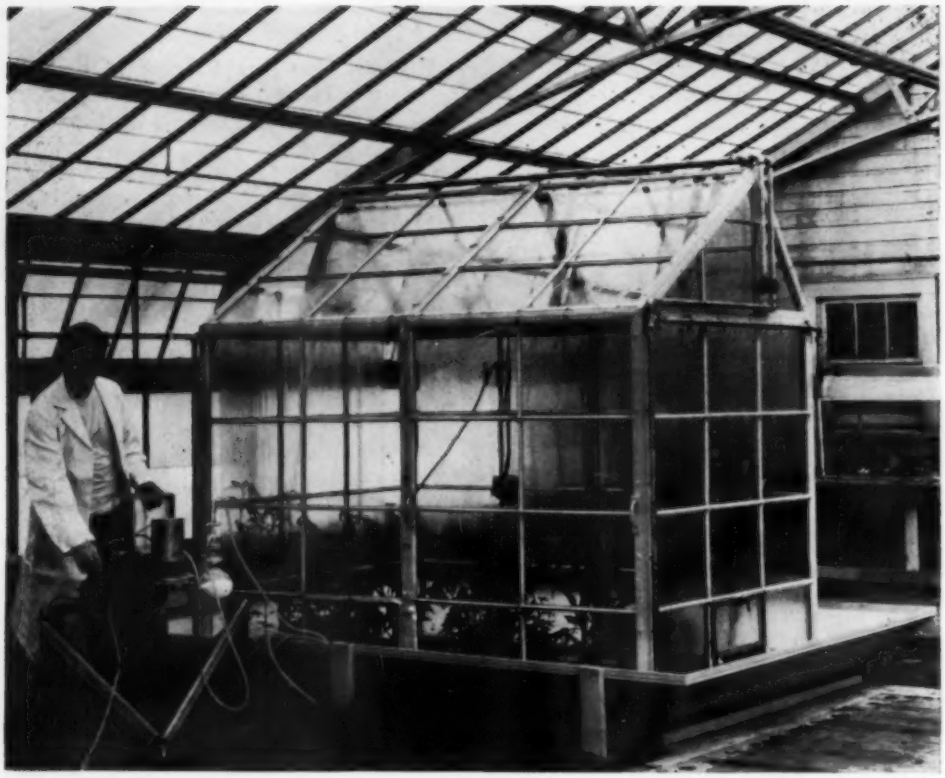
Separating each laboratory from the hall is a small preparation room, where the scientist has a knee-operated sink in which to wash his hands; a locker in which to store his lab coat and shoes, and space for the storage of chemicals and apparatus.

All waste from the drains of the lab sinks is first deposited into a series of glass-lined tanks in the basement where it is checked for radio-activity. If it is found pure, it is dumped into the sewer. If contamination is found, it is treated to remove the radio-activity before it is disposed of.

Directly over the door of each laboratory is a shower head. Leading from it, is a chain running down the side of the door jam. If a person working in a lab should be burned by acid or come in contact with some other damaging substance, he can go to the door and by pulling the chain release a cascade of water that will wash it off. These showers, once turned on can only be turned off in the basement. According



Chemical and physical processing of radioactive materials which emit very penetrating radiation is carried out at Argonne National Laboratory in "hot" laboratories of the type shown. Junior Metallurgist Donald W. Hacket is shown as he operates a Master-Slave Manipulator, a device which reproduces the seven human motions which are employed in grasping, lifting, moving, and turning objects. By manipulating handles located outside the "hot" laboratory, one can cause duplicate motions to take place beyond the wall. The laboratory wall is composed of concrete which is approximately 3 feet in thickness. Special windows, 36 inches in thickness, and made of non-coloring glass, enable the operator to view work being done inside the enclosed unit. Modified vacuum cleaners on the floor near the operator are used to survey the amount of radioactive particles in the air. The quantity of radioactive materials, collected on filter paper in the device, is indicative of the amount of radioactive dust particles in the air.



Radioactive drugs and other plant products, which cannot be manufactured chemically, are being produced at the Argonne National Laboratory by use of the equipment shown. The plant growth chamber has been developed to expedite studies of plant processes. At the Laboratory's Radiobiological Experiment Station, Dr. Norbert J. Scully (shown above) and associates are growing various drug-producing plants in a sealed chamber in which a predetermined amount of radioactive carbon dioxide is supplied to the plants. By the process of photosynthesis, plants combine carbon dioxide and water to form a large and important group of substances. By substituting radioactive carbon dioxide for the carbon dioxide normally present in the air, all carbon-containing products of the plant are radioactive. Studies of the behavior of drugs within the body of animals will now be possible.

to Lester Furney, assistant director of the laboratory, this precaution was made to insure a constant flow even in the event the person should faint after he had once turned on the water.

The interior of the building is the unique construction. The partitions are built of demountable steel sections, so that a large lab can be divided into a number of small labs or vice versa.

The floors of the halls and offices are covered by asphalt tile, while those in the laboratories are covered by vinyl plastic, chosen because of its resistance to most chemicals.

Also included in the building is a number of machine shops where needed equipment can be manufactured. Furney explained that by the nature of the research being carried on, the scientists needed pieces of equipment not manufactured by any firm. Since this equipment would only be used once, it was found to be cheaper to manufacture it on the spot.

A modern auditorium on the second floor of the chemistry building is for visiting scientists and discussions.

Among the larger buildings are those occupied by chemistry, physics, and chemical engineering. Still under con-

(Concluded on Page 48)

Memories of an Old Time Silver Craftsman

by L. C. Aldrich
LaGrange, Illinois

The chap who originated the remark that History Repeats Itself could have had me in mind. Forty years ago I made jewelry for a living. Delicate, symetrical, graceful pieces to grace the ladies of that period, very definitely not of the dinner plate variety so much in vogue today. But after several years as a silver craftsman, I resigned to seek a more renumerative trade. It seemed there was no future in the jewelry business and after all, a man must eat.

I have been asked how jewelry making forty years ago differed from the present day methods. To find out, let's take a trip back forty years to the Craft Shop in Keene, New Hampshire.

The Craft Shop wasn't a very pretentious establishment. It was housed in a one story brick building about twenty-five feet square. But inside this small structure worked three people, John the owner, another craftsman whose name I have forgotten and myself.

John was a Dutchman, a small man with hands like hams and a horse face that only a mother could love. He was a wonderful designer and had been honored by a number of Crafts societies for his work. As a jeweler he was extremely capable and many times I have stopped my own work to watch him form some silver or gold detail and skilluflly solder it into place using the crudest of tools and an old fashioned blow pipe and alcohol lamp. John was a perfectionist and I can still hear his "There *ain't* no such thing as too little solder!" For John, this was reasonably true for his solder joints were always so beautifully formed and fitted that little solder was required. Anything but perfection *souly* tried John and he must have led a hectic existence with his two workmen whose work very definitely did not fall into that classification. Besides, the solder was made in the shop and could not be wasted.

Into the one room of the shop was crowded a number of show cases to display our products, work benches for the three of us, polishing wheels on a stand and powered by a large foot-operated fly wheel, a crude but quite efficient lapidary outfit also powered in the same manner, John's desk and desk chair, a sink with running water and a large "Acorn" coal stove which it was my responsibility to keep well stoked and polished. In addition across one end of the room a curtain was stretched concealing a large iron safe with hand painted roses on the door and a cot bed. For the safe, for all its imposing appearance was locked with a large brass key and could probably have been unlocked with almost anything from a corkscrew to a lady's hair pin and it wasn't considered good judgment to have it unguarded at night. Therefore the other workman and I took turns sleeping in the shop and guarding the safe with an ancient "Hopkins and Allen" revolver which would probably have exploded and blown our hands off had we had occasion to fire it. The use of the word "sleep" is used very loosely since there were certain difficulties pertaining there-to which made sleeping extremely difficult until certain changes had been made. I refer to the incident of the rooster.

The rooster in question was a very large and ancient barred rock who had a despotic reign over a monarchy of about twenty hens located in a pen at the rear of the shop. This rooster, for all his age, was romantically inclined and therefore held in high esteem by his harem. He had, however, one serious fault, — a voice like the Nantucket light-ship in the fog and when he sounded - off periodically during the night there was no sleep for the man on guard. Clearly, corrective measures were indicated — but what?

When approached on the subject, the rooster's owner was agreeable to any reasonable bray preventatives so long as it did not affect either the rooster's health or romantic impulses. So we borrowed a loud "Cadillac" horn of the bulb type from the local garage and arranged it for remote control by inserting a section of rubber tubing between the bulb and the horn. The bulb was then located inside the shop adjacent to the cot where it could be well squeezed at the psychological moment and the tubing led through a hole in the wall to the horn which was installed in the chicken coop and adjacent to the perch on which the rooster spent his night time siestas. It was our assumption that pressure energetically applied to the bulb at the beginning of the bray wind-up would produce a competitive blat which we hoped would have the proper effect. It did.

They say that a jackass cannot be stopped in the middle of his bray or a rooster in the middle of his crow. I don't know about the jackass but feel that I can speak with authority regarding the rooster. No matter how fixed the crowing habits of a rooster have become he can be muffled by a properly applied silencing routine. However, a word of caution, your rooster will never be the same again. He will lack spirit and initiative. He will have the attitude of one who has lost something very essential to his otherwise placid existence.

Across the street from the shop was a large silver manufacturing concern—the Newburyport Silver Company I believe it was called. This plant was even at that early date an old and very fine New England establishment and to the best of my knowledge is still doing business at the old stand. However, it appears probable that we did not view this organization with the respect to which it was entitled. To our way of thinking they were makers of tea pots, platters and things of a like nature. They were silversmiths and very definitely of a lower caste than we craftsmen who made the fine jewelry and we were careful to keep the records clear on this point. Our paths did not cross with the possible exception that we might occasionally break down and solder together a busted tea spoon that by rights should have been referred to the other organization but it was only on account of the thirty-five cents involved in the deal that such lapses in the fair trades practices were tolerated.

Crude tools were generally used in our work. John was not exactly a spend-thrift and he could see no reason why tools that could be made by hand should be purchased. Consequently we had a large accumulation of various original devices for working silver and gold, many of which only the originator knew how to operate. Soldering was mostly done with a blow pipe and an alcohol lamp although we did have one torch operating from city gas and a sort of balloon that was pumped up by means of a foot-operated bellows. This latter unit was, however, considered too hot for the common workman and therefore reserved for the use of the master and for casting. It must have been quite a shock for a customer entering the shop to see several faces peering at him over the top of high silver-working benches, faces with eyes protruding and cheeks distended like a severe case of the mumps. To make matters worse, one cannot talk coherently with a brass blowpipe stuck in the side of his mouth and can only make signs until that particular soldering operation is completed.

Polishing was done on a foot-operated lathe-like affair using assorted buffs and arbors, tripoli and rouge. This machine was quite difficult to pump and customarily when the master had polishing to do I was elected, not so much because of my particular ability in this line but rather due to the uncanny ability of my associate to always seem to have a blow pipe in his mouth and a particularly complex soldering job on his hands at the psychological moment.

Such gold plating as was required was accomplished with an earthernware jar of solution kept hot with a

"It must have been quite a severe shock for a customer entering the shop to see several faces peering at him over the top of high silver-working benches—faces with eyes protruding and cheeks distended like a severe case of the mumps."

Bunsen burner, dry batteries and a gold anode. I early learned about that business the hard way. I had agreed to gold plate a small brooch for thirty-five cents but forgot and left the brooch in the solution for several hours resulting in about a four dollar gold deposit and a corresponding reduction in both the anode and my not-too-extensive salary for that week.

Casting was attempted by a contrivance consisting of a small cylindrical tank with casting flask attached to the top and connected to it by a small valve. In addition there as a hand pump to evacuate the tank. The theory of operation was to prepare your mold in the flask using a porous substance somewhat like plaster of Paris, pump the tank "full of vacuum" (the accepted terminology for evacuating the tank), melt the silver in a small retort and pour it into the mold at the same time opening the valve connecting the flask with the tank, and hope for the best. This outfit was extremely temperamental and usually refused to function for anyone but John, so the accepted practice was to try it 3 times (3 was considered par), then put the casting machine back on the shelf and build up your silver the hard way.

This casting machine brings to mind an incident wherein I had my faith in my associates seriously shaken. Several doors away there was a bakery specializing in very elegant pies which could be purchased for the nominal price of fifteen cents. These pies were taken hot from the oven at about 4 P.M. and shortly before that time it was our practice to call a halt on production sufficiently long to play one hand of rummy to determine who would go and get the pie. We then matched coins to decide who paid for it. I lost more than my share of the coin matchings, something I could not account for

until one sad day I discovered that both John and my associate were, to say the least — slightly dishonest in their financial dealings with me. It seems both owned quarters with heads on both sides — products of the casting machine!

Hours at the shop were long — from 7:30 A.M. to 6:00 P.M. every working day, Monday through Saturday, except that Thursday evening (band concert night) and Saturday evening we kept open until 9:30 P.M. We workers didn't mind the additional evening time — for which we did not receive extra pay by the way, since during these hours we would have many young lady visitors from the high school and sometimes (oh happy day!) from the State Normal School, in front of whom we could swell around and discuss learnedly various complex subjects pertaining to our profession. In addition, there were invariably certain desirable young ladies living in outlying sections of the town and therefore in need of escorts to their homes. All in all, Thursday and Saturday evenings were, as I remember them, very pleasant.

I have mentioned lapidary equipment. This equipment was quite crude and was mostly for cutting. Our needs for faceted stones was generally filled by an extremely expert amateur lapidary living in a nearby town. This man had a sort of rig built around certain parts of an old bicycle frame that furnished the power and I have seen him facet-cut many beautiful stones while perched on his bicycle

"I have seen him facet-cut many beautiful stones while perched on his bicycle seat and grinding away for dear life."

seat and grinding away for dear life. I have often wondered how well some of our leading rock hounds would fare under similar circumstances. I might mention that this lapidary used an old fashioned jam peg for his cutting, which, in addition to his bicycle, operated horizontal laps, made facet cutting quite a chore in my humble opinion.

Materials for faceted stones used by us were mostly local and were generally aquamarine, beryl and smoky and rose quartz. Most of it was furnished in the rough by a farmer from a nearby town whose farm had quite a bit of it for those who had the time to search. This farmer usually arrived in town on Thursdays with a load of apples, cord wood or whatever product was in season and could be expected to arrive at the shop accompanied by a pocket-full of crystals and an extremely penetrating "horsy" odor for our consideration (the crystals not the odor). On cold winter days the heat from the stove plus the aroma created an atmosphere which must be experienced to be properly appreciated. He generally timed his arrival just right to necessitate an invitation to our private pie social but I do not remember his ever having offered any assistance in the financial portion of the transaction.

All this brings back fond memories of forty years ago and I believe I will go now and cut a stone and make a ring. Then I will examine the ring and say to myself, "John, are those joints made tight enough? Have I used too much solder? Is my design artistic or weak? Are the corners hard or flowing and smooth?"

You must have passed on many years ago, John, but I am sure I would know your answers. You wouldn't criticize the workmanship, John, because you would realize that a man can get awfully rusty in forty years. And you would go awfully easy on the design because you gave me up as hopeless in that department long ago. But you were always a sticker for "tight" joints well soldered. And so, John, if when I examine my ring I find the joints well formed and with a minimum of solder I will be well satisfied because I have met your approval. I have not forgotten a *good* craftsman makes his joints *tight* and with *tight* joints "there *ain't* no such thing as too little solder!"

* * *

AMERICAN FEDERATION OBJECTIVES

When one reads the objectives of the *American Federation of Mineralogical Societies*, he cannot but be impressed with their seriousness of purpose.

Quote: "To promote popular interest and education in the various Earth Sciences and in particular the subjects of Geology, Mineralogy, Paleontology, Lapidary and other related subjects, and to sponsor and provide means of coordinating the work and efforts of all persons and groups interested therein; to sponsor and encourage the formation and international development of Societies and Regional Federations and by thorough means to strive towards greater international goodwill and fellowship." (Article II)

This, we believe, is something that will really work. All of us know full well what great strides the American Federation has made in this direction in the development of many wonderful friendships and acquaintances throughout the land, and what will work on a small scale should also find success in lerger areas. Anythings which will engender "international goodwill and fellowship" today, is mighty important and should be encouraged in every possible way. With some sort of a clearing house for overwhelming language difficulties much might be done along this line. Forces to accomplish this are now at work.

COVER PHOTO — *By Dick Babbit.* The rancher pauses on his way to visit his sheepherder in the high country. View toward (but not including) Uncompahgre Peak, northwest of Lake City, Colorado, in Uncompahgre National Forest.

LAPIDARY TOPICS

Lapidary processes are many and varied. Everyone has his own pet methods, some of which are satisfactory and some are not entirely so. The beginner is often at a loss to determine where to start among all the conflicting information that is told him and that he reads in various publications. Staff Member William J. (Bill) Bingham has consented to write a series of four articles with the idea of condensing the available information to its basic or elementary form from which, by common sense and reasoning, good machines or procedures can be determined or developed.

The basic lapidary processes can be boiled down to four: The three abrasive ones — sawing, grinding and smoothing and then the final polishing which is a flowing or smearing procedure. The procedures described are those the author uses every day as the fastest and easiest that produce perfect results. These articles will be of interest to both the beginner and the old timer.

Note for program chairman: The author, William J. Bingham, is available for lectures on Lapidary and Gemological subjects before Mineral or Lapidary Clubs and groups.

* * *

The Qustion Box

Do you have a little problem in your shop?

Questions on LAPIDARY subjects may be sent to The Question Box. Mr. William J. (Bill) Bingham of St. Paul has consented to try to answer the questions.

The following rules will apply:

1. Each question shall be submitted on a separate sheet of paper with enough blank space on it for the answer.
2. A question should have only one subject so that the answers can be short and direct. Questions requiring excessive discussion in the answers or those that can be answered by reading any of the ordinary handbooks will not be answered.
3. Each question must have the sender's name and address thereon.
4. All questions submitted become the property of the Earth Science Digest and will not be returned.
5. All questions shall be submitted to the Editor, B. J. Babbitt, 140 Northgate Road, Riverside, Illinois on or before March 15 for answering in the May issue.

* * *

The Basic Lapidary Processes

I–Sawing

by William J. Bingham

Sawing is usually the first operation on a stone or gem that is going to be made into either a specimen or a gem or just for exploratory purposes.

There are several types of saw blades but only the two circular diamond types will be discussed here as the mud saw and others are too slow and messy to be considered by the average lapidary, although they do have uses on rare occasions.

The arrangements of the several components of a sawing machine are of great variety, but the main points to be considered in designing, building or buying a machine are:

First: Rigidity — there should be no looseness or appreciable deflections of any parts under load; also there should be no wearing parts that cannot be adjusted or replaced easily. No wearing parts should be subjected to the coolant spray with its very abrasive cuttings.

Second: Ease of Loading — the area around the vise should be convenient to get at and the vise should be capable of operation with one hand while the stone is held by the other.

Third: Good Visibility — the stone being sawed should be visible at all times.

Fourth: The splash pan should be of such design that it confines all the splash and spray inside and also that it may be easily cleaned of saw cuttings.

Fifth: The coolant supply should be plentiful but not excessive (preferably adjustable) and the amount available should always be known either by an indicator or visual observation.

Sixth: The pressure of the stone on the blade should be known quite accurately and be easily adjustable. (Many saw blades are ruined or their lives shortened by excessive pressure.)

Seventh: All controls should be easily available from the operator's position.

Each machine is a compromise and no one saw can have 100% of all the above desirable features.

There are only two types of circular diamond saw blades available to the lapidary — the notched rim and the sintered rim types. The cheapest and the most common one is the notched type which is a soft steel (or copper) disc in the notched rim of which diamond particles are inserted. The notches are hammered or rolled shut on the diamonds to hold them in place which at the same time makes the rim thicker so that the saw cut will be wider than the thickness of the balance of the blade. In the other type the diamond particles are mixed with bronze powder and sintered to the rim of a tough steel disc.

The sintered type is much more expensive in first cost than the notched type but potentially lower in cost per square inch of stone cut as, with proper care, it outlasts several notched type blades. It is more easily damaged and if broken is almost impossible to repair. The notched type is the best type for the amateur lapidary as it will stand more abuse and can be straightened if not too badly bent. A notched type blade of 12" diameter should have a useful life of 1,500 to 2,000 sq. in. of agate or equivalent, if properly used. The notched rim type blade should run about 1,000 to 1,500 ft. per min. peripheral speed while the sintered type can run up to 3,000 ft. per min. To break in a new blade or rejuvinate one with a "smeared" rim, one should saw some gritty material such as a piece of sandy limestone, a brick, an old fine-grained emery wheel, an aluminum oxide wheel or an old whetstone. Do not use too coarse or harsh an abrasive for this, as it may grind away too much metal so that the diamonds will fall out easily.

The methods of feeding a stone into the blade are many and diverse and are divided into 2 types — the swinging arm and the carriage traveling on guides. The type where the saw is moved into the stone gets into so much complication in controlling the coolant splash that it will not be considered here. The swinging arm type with a vise mounted on a shaft which can be rotated or moved endways and clamped where desired makes a very good arrangement when the arm is outside of the splash pan and the pivot bearings are easily adjustable for wear and alignment.

A carriage traveling on rollers or ball bearings on guides with a similar rotatable vise also makes a good arrangement. In any case, the stone should travel *exactly* parallel to the saw blade; if it doesn't, it will warp or dish the blade and cause friction and heating. Provision should be made for adjusting this alignment.

The motion of the stone into the saw is produced by either gravity, power (screw) or hydraulic cylinder. The hydraulic cylinder with its pumps, control values, etc. gets quite complicated. The power feed with a motor driven screw to move the carriage can produce excessive pressures on the stone if it is not adjusted properly for the type of stone and the condition of the saw blade. If it has a slipping friction clutch or belt drive to the screw, it has the same effect as gravity feed but with the addition of a lot of mechanical complications. The screw feed has the advantage of almost automatic starting and finishing the cut. The gravity feed should be easily adjustable as to the pressure produced on the stone. The pressure

should vary according to the size and type of stone being cut and the automatic starting and finishing cut can be provided by a retarder device that limits the speed of travel to a normal amount, whether or not the stone is in contact with the blade. It is very desirable to have an indicator or scale of some kind that indicates the pressure on the stone. The normal pressure on a notched blade is 3 to 6 pounds per lineal inch of contact between the stone and the rim of the blade. With a sintered rim blade, the usual pressure is 4 to 8 pounds per lineal inch. These pressures are for agate and jasper and similar tough stones. Actual hardness has little effect on the required pressure but brittle stones need much less pressure than tough ones.

Too much pressure on a saw will cause the sawed surface to be rough. Too little set will cause binding, friction and heating. If the blade has run over sharp broken edges on one side a number of times, the set is worn off that side and the blade will tend to make a curved cut with its resulting binding and friction.

The purpose of the coolant is to keep the saw and stone cool and to wash out the cuttings. It is a mistaken notion that *lubrication* is desired, therefore, the best coolant is water, (which will rust ordinary saws) as it has the highest specific heat of any available liquid; next best is kerosene. Oil in any form should not be used as it cannot be removed from porous or cracked stones and will ruin some materials, whereas kerosene will evaporate in a few hours and leave the stone in its original condition; also, it will not rust steel parts.

The coolant can be placed in the bottom of the splash pan and fed to the saw blade by wicks (a very satisfactory method) or it can be drained to a sump, filtered, and pumped back up to the blade. The coolant should be distributed all over the blade on both sides from the clamp washers to the rim. Excessive coolant should not be used as too much will reduce the cutting effect of the blade. If the saw leaving the cut is dry, either too much pressure or not enough coolant is being supplied and the condition should be corrected immediately.

Since stones come in all sizes and shapes, the problem of clamping in the vise is different for every specimen. As most rough stones are quite irregular, the jaws of the vise are lined with hard wood into which the small bumps and projections are embedded by the clamping pressure.

Pointed ends should not be put against the jaws as the stone will tend to pivot on them. Each stone should be checked after it is clamped, as a stone that comes loose and is thrown around by the saw may damage the blade and the machine. A well-clamped stone cannot be moved or wiggled by the hand. The saw cut should be started on a relatively smooth surface, not on a sharp edge. Small stones or slabs to be split in two are mounted on a wood block with dopping wax and then the wood block is clamped. A basket or receptacle should be provided to catch the pieces that are sawed off instead of letting them fall into the sludge in the bottom of the pan.

The above discussion will probably bring up many questions that may be asked through the "Question Box" column. I have tried to tell of the many pitfalls that can arise but if the lapidary will follow the above advice, he can build a satisfactory machine and do good sawing.

* * * * *

EARTH SCIENCE QUIZ No. 5

Test Your Knowledge! How much do you know? How many of the following terms can you define? They are arranged in three groups with progressive difficulty. Group 1, things everybody should know; group 2, things good "rock-hounds" should know; group 3, things which experts might be expected to know. Try your luck. To score—add up total points as indicated by the group number and rate as follows: 1-6 poor; 6-13 good; 14-20 excellent; 21 perfect. Answers on page 34.

(1) a. anthracite	(1) e. conglomerate	(2) i. malleable
(1) b. rock crystal	(1) f. pumice	(3) j. Pelee's hair
(1) c. travertine	(2) g. half-breed (mineral)	(3) k. guano
(1) d. igneous	(2) h. crystal axis	(3) l. intrusive rock

Drilling Holes in Stones

Dear Editor:

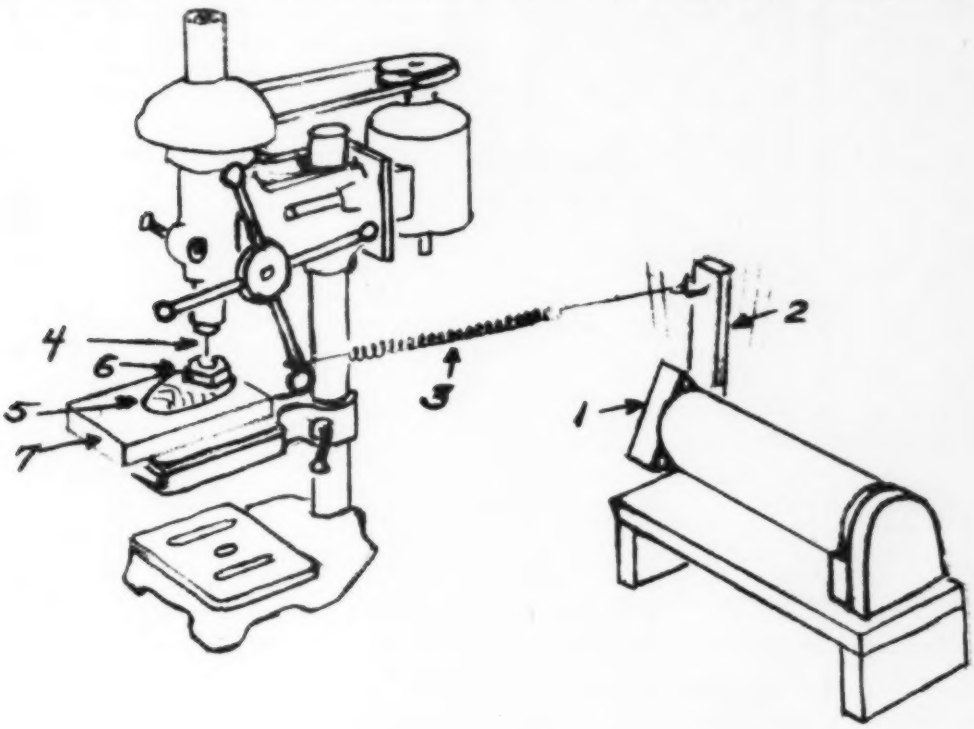
My set-up for drilling stones is described herewith; the sketch will help explain some of the details. (Numbers in parentheses refer to the sketch.)

I had an old table ironer that had been discarded so I fixed a three pointed eccentric (1) on the shaft and then took a piece of nominal 1" board 3" wide and 18" long (2), fastened a door hinge on one end of it and mounted it on the table so that the eccentric would push against it. From this arm I ran a screen door spring (3) to the handle of the drill press so that the eccentric pulls the handle and brings the drill (4) down onto the stone (5). As it slacks off, it lets the drill rise and get a new supply of grits under it. By using the spring, it will not put too much stress on the drill or break the stone.

I use 1" brads for drills with the heads down. It takes a brad for each hole. I use a three-eighths nut (6) for a cup to hold the grit. This I do by putting cup grease on the nut and pressing it over the hole and then I put the grits in the hole in the nut. I use light oil or water as a lubricant for the brad.

I always dop my stone to a board (7) and then clamp the board to the drill table. This outfit will do the drilling while I am doing something else.

Incidently, I might also add that I have been using the new peel-em-off cement this winter and I sure like it better than going to the lap wheel and it is much faster than the old drum sanding method.



DRILLING HOLES IN STONE

Yours for better rocking,

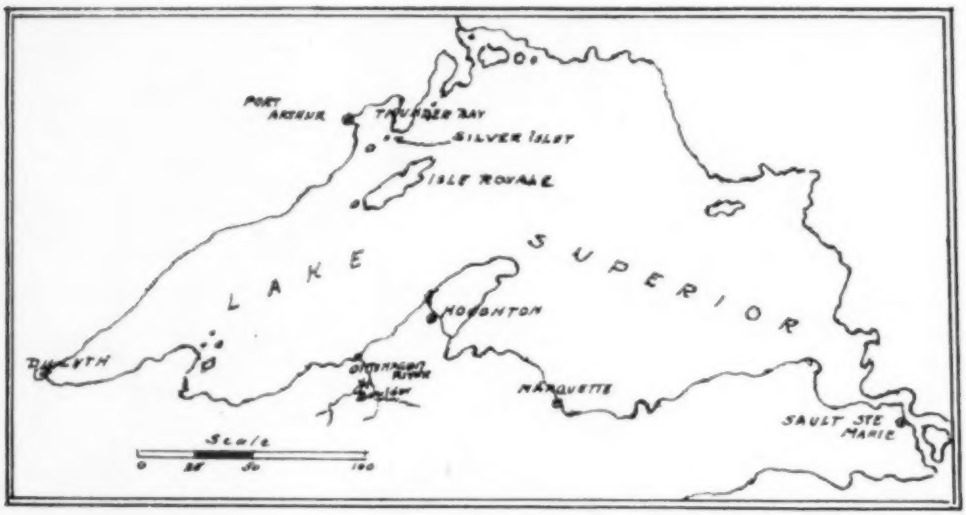
Ye Old Timer,

Earl M. Van Deventer

Silver Islet — Bonanza

by Dr. Frank Fleener
Joliet, Illinois

The fact that pure silver could be found intimately mixed but not alloyed with native copper in the Upper Peninsula of Michigan was known from earliest times. It is not at all improbable that the Indians of the Mississippi Valley region knew this to be true many centuries before the advent of the Europeans upon the scene, as is attested by the fact that hand-wrought ornaments of the white metal have been recovered from their burial mounds. From time to time small pieces of the metal came under the notice of the French and English fur traders, but they gave the matter little heed.



Sketch map of Lake Superior showing the location of Silver Islet. By Frank L. Fleener.

However, in 1766, we find one Alexander Henri, an Indian trader, on the banks of the Ontonagon river, where by cajolery and bribing he had been guided by the Chippewas to see the Great Manitou, a ton and a half boulder of native copper. Henri trimmed about a hundred pounds of copper from the boulder with an axe, and, with his shining specimens, he returned to London. In the course of time Henri organized a mining company of titled Britons, headed by the king, who were chartered to "Develop a copper and silver mine." It would thus appear that he knew something about the native silver. Henri employed and equipped a party of Birmingham coal miners, and they took ship for Montreal. Some months later we find him and his party on the Ontonagon, close by the Great Manitou boulder, where they dug some forty feet into the river bank. Frequently small masses of float copper were met with, but no silver. The season closing in on them, they abandoned the project and returned east. However, Alexander Henri appears to be entitled to two "firsts"; undoubtedly he was the first white man to view the sacred Ontonagon boulder, and his tunnel dug into the river bank may be considered as the first mining operation in the Lake Superior region.

Much pure silver came to light with

the opening of the copper mines of the Keweenaw Peninsula in the 1840's of the last century; in fact, the upper levels of some of these mines could have been taken for silver mines instead of copper. For instance, during the opening stage of the Cliff Mine, more than four million dollars worth of coin silver was credited to the company's account at the United States Mint in Philadelphia.

Nevertheless, the greater portion of the silver recovered from the Keweenaw copper mines was never recorded on the books of the mining company. It was carried out in the miners' dinner pails, which fact, strange to relate, did not involve the least hint of "high grading," since the articles of incorporation of the Michigan mines usually stated "a company formed for the purpose of mining copper." Naturally, the miners interpreted this matter with a naive literalness, the accepted rule being that the silver belonged to whoever found it first. No one can say how much silver was extracted in this manner, but it is fairly certain that two of Chicago's wealthier families founded their fortunes on profits obtained from dealing in this silver.

The strangest tale of silver found in the Lake Superior region concerns the Silver Islet Mine, located about a hundred yards off from Thunder Cape on Thunder Bay, Canada. The islet, less in area than a meager city lot, lies so low that only on calm days does it dry off a space sufficient to accommodate a filling station. Nevertheless, in 1868 this trifling bit of rock became the focal point of an unusual stir of interest. About this time the Montreal Mining Company sent out an exploring party to search the region around Thunder Bay for an outcropping of copper-bearing rock. Geologists had averred that the copper lodes of the Keweenaw Peninsula dipped down under Lake Superior and should appear along the north shore of the lake. Investigation by the party had showed that the premise was at least partly true; the same trap rock full of amygdaloids appeared, but no copper in commercial quantity was to be found.

Two geologists of the party, Thomas McFarlane and John Morgan, came to Thunder Cape late one afternoon and, lured on by the amygdule-bearing basaltic rock, decided to investigate the little off-shore island. Landing from their canoe, they were delighted to note that the surface rock presented a network of ridges projecting upward from the cracks and crevices which they mistook to be copper. Breaking off some of the projections proved to them that they had not found copper but pure silver, the main vein of which widened out to be as much as two feet and extended out an unknown distance under the water of the lake. From that time until darkness put an end to their frantic operations, the two men succeeded in collecting nearly a half ton of almost pure silver.

In spite of the enticing nature of this discovery, the Montreal Mining Company wanted no part of it and considered that they made a good bargain when they sold their holdings for a quarter of a million dollars. The adventurous purchasers of this most peculiar mining proposition were a group of New Yorkers who had Copper Country interests and experience. Moreover, on occasion, they had enlisted the services of one William B. Frue to help them overcome tough mining problems. Frue took this job and shortly after the deal was completed, visited the islet and studied the unpromising situation. After formulating a plan that he felt sure would make it possible to secure the silver, Frue returned to confer with the directors.

On September 1, 1870, Captain Frue (mine superintendents in the Copper country were called captains) appeared at the Islet with a shipload of mining gear, a crew of picked men, and necessary supplies, and a great barge loaded with 20,000 feet of heavy mine timbers to build the breakwaster. A log-house town was set up on the mainland for Frue and his crew, and a month later the wives and children ar-

rived, after a stormy three-day voyage in crossing the 150 miles from Houghton. No sooner had these newcomers settled themselves in their new quarters than Lake Superior began blowing up a record-breaking winter, during which the thermometer seemed to habitually register minus thirty degrees, and snow literally buried the little log cabins within which the women and children huddled around the stoves for six long months.

Frue, however, who looked upon bad weather as just another difficulty to be overcome, drove his men in the preparation of the timbers for the construction of the breakwater, and, as soon as the shore of Silver Islet (so named by Frue) was free from ice, construction was begun and within a month cribbing thirteen feet high, filled with huge blocks of rocks, extended half way around the Islet. A water-tight cofferdam was then built, enclosing the rich silver vein, a steam pump was installed, and the vein was pumped dry. It appeared that Frue had the situation licked and that the next move would be to begin to take out ore. But Frue was not familiar with all the moods and might of his adversary, Old Lake Superior. Before all the arrangements for sinking the shaft could be made, Superior kicked up a furious three-day storm and within an hour half the breakwater had been washed out, the cofferdam smashed to kindling wood, and the vein of silver again submerged under the waters of the lake.

All photographs in this article were taken prior to 1884 but the identity of the photographer is unknown.

Capt. Frue would not have been the man he was if he had become discouraged at this rebuff. Clearing away the debris of the storm, he began rebuilding the breakwater, this time constructing it of two walls of heavy cribbing twenty-three feet apart, filling the space between with some 3,000 tons of rock and boulders. No sooner was this work completed than Superior beat up another storm more furious than the first, which tore the timbers of the breakwater apart and scattered the heavy stones in every direction. By this

time, the Silver Islet project had cost the New York promoters more than $50,000 in cash, to say nothing of the timber and stone that had been used and lost in the breakwaters. Some of the directors were in favor of throwing in the sponge in favor of Lake Superior, but not Bill Frue; his dander was up and he wanted to try again, and after some quibbling he was told to go ahead. This time he decided not to build a breakwater all around the Islet. Instead, he projected a half-moon-shaped breakwater with seventy-five feet of space between the walls, which he packed with boulders to protect the vein from the S.W. This breakwater, acting much like an ice-breaker, split the force of the waves and diverted the water to either side, resisted the most furious onslaughts of Old Lake Superior for thirteen years

or longer. Another Cofferdam was constructed and pumped dry, and at last work was begun on the shaft, and from that time on to the end, bountiful returns were forthcoming from the venture.

In order to comprehend in a measure the phenomenal richness of this vein, we must select a few figures from Murdock's book "Boom Copper" in which he writes: "In that same year, in November 1871, rock which produced $108,000 in coin silver was shipped from Silver Islet. In 1872, $600,000 worth of silver was reduced from Silver Islet rock; and the following year, $2,250,000 worth of coin silver." These figures become still more staggering when we consider that the mine was practically shut down during the six months. The vein was fabulously rich; at times the ore assayed from

$300 to an amazing $10,000 per ton, and, during the peak of production, $370,000 was produced in two weeks. More startling still is the fact that a drift suddenly opened a pocket in which pure silver had been deposited five feet thick that yielded huge chunks of pure metal. All in all, this diminutive island mine produced $3,500,000 in silver during the thirteen years that it was in operation. There are but few if any other silver mines of which this can be said.

Late in November of 1884 the Silver Islet project came to an unexpected end. For some unknown reason, a tugboat towing barges loaded with the winter's supply of coal that was necessary to keep the pumps operating at the mine, waited just too long before casting off from Houghton, and, before it could reach the open water of the lake, it became hopelessly frozen in the ice of the Portage Lake Ship Canal, where it remained immobilized for many a long day. Meanwhile, on Silver Islet, Bill Frue and his men watched the horizon anxiously for the streak of smoke that foretold the approach of the precious coal. Eventually, their meager supply of fuel shrank to nothingness, and Frue set his men to beating up the lumber of the buildings and even their boats, all to no avail except to prolong the period of anxiety. The pumps stopped, and the relentless waters of Lake Superior slowly filled the shaft, while Capt. Frue and his valiant crew stood about the shaft-opening in mournful silence, as if at a funeral of a deceased relative. So fate, in the guise of the icy fingers of Old Boreas, had brought to an end the peculiar story of the mining venture of Silver Islet. Much rich silver ore still remains in the pillars and ceilings of the drifts and stopes which penetrate for over 1200 feet the resistant basaltic rock of the Islet, and anyone who is willing to emulate the prowess of Capt. Bill Frue and take up the gauntlet with Old Lake Superior may win both fame and fortune.

MINERALIGHT SL-2537

All purpose lamp, operates on 110V AC, weighs only 1 lb. $39.50

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Contains special battery circuit for MINERALIGHT SL-2537 or SL-3660. Case holds lamp, batteries, built-in daylight viewer. $19.50 (Plus Bats. $4.50) Complete: SL-2537, 404 CASE, BATS. $63.50.

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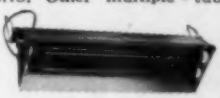
A high quality 110V AC lamp giving excellent intensity and coverage for mineral sample exhibits and displays. Price $25.75. Other multiple-tube models available.



Some materials fluoresce to short wave lengths and some to long wave lengths. Others will react to both wave lengths but with different color responses. Although practically all commercially important minerals (the ones that have real monetary value) are activated by short wave, many collectors specialize in the more unusual long wave minerals.

LOUISIANA
Riley's
423 Crockett St., Shreveport

MASSACHUSETTS
Schortmann's Minerals
6 McKinley Ave., Easthampton

Quabbin Book House
Ware

MICHIGAN
Int'l. Stamp Bureau
125 W. Adams Ave., Detroit

MINNESOTA
Nokomis Lapidary & Watch Shop
3840 26th Ave. So., Minneapolis

MISSOURI
Asterley Ozark Shop
U.S. Hwy 61-67, De Soto

Craven's Diamond Shop Co.
2008 Bryant Bldg., Kansas City

Cy Miller
110 E. 13th St., Kansas City

MONTANA
Yellowstone Agate Shop
Box 4, Hiway 89, Livingston

NEBRASKA
Hastings Typewriter Co.
518 W. 3rd St., Hastings

NEVADA
Toiyabe Supply Company
Gabbs

Woodfords Cash Store, Woodfords, Calif., P.O. Gardnerville, Nev.

Arthur C. Terrill
15 Water St., Henderson

Rock Hollow, Last Frontier Village
Las Vegas

Ken Dunham
P.O. Box 150, Mina

Commercial Hardware Co.
500 E. 4th St., Reno

Nevada Gem Shop
335 East 4th, Reno

Nevada Mineral Laboratories
336 Morrill Ave., Reno

Tonopah Studio
P.O. Box 331, Tonopah

NEW JERSEY
Slidecraft Co., Meadows A.V.C. Service, Mountain Lakes

Para Laboratory Sup. Co.
221 N. Hermitage Ave., Trenton

Westfield Lapidary & Sup. Co.
309 Hyslip Ave., Westfield

Garden State Minerals
332 Columbia Blvd., Wood Ridge

NEW MEXICO
New Mexico Minerals
11003 Central N.E., Albuquerque

Deming Agate Shop
1012 E. Maple St., Deming

Adobe Crafters
Rt. 2, Box 341, Santa Fe

NEW YORK
New York Laboratory Sup. Co. Inc.
78 Varick St., New York City

New York Scientific Sup. Co.
28 W. 30th St., New York City

The Radiac Co. Inc.
489 5th Ave., New York City

Standard Scientific Sup. Corp.
34 W. 4th St., New York City

OHIO
Akron Lapidary Co.
1095 Chalker St., Akron

Cincinnati Museum of Nat. His.
Central Pkwy at Walnut, Cincinnati

OREGON
The Rock Market
R. 1, Box 225, Eagle Point

The House of Guns
111 Washington St., Garibaldi

Hodge Podge Agate & Supply Shop
322 Hiway 99 S., Grants Pass

Wrightway Gemcrafters
P.O. Box 4, Hauser

Smith's Fluorescents
Rm. 311-220 S.W. Alder, Portland

Dorothy's Gift Shop
4639 N. Stephens, Roseburg

White's Furniture
1218 M St., Sweet Home

PENNSYLVANIA
Lost Cave Mineral Shop
Lost Cave, Hellertown

Sirchie Finger Print Labors.
922 Chestnut St., Philadelphia

TENNESSEE
Technical Products Company
19 N. Dunlap, Memphis

TEXAS
D & B Engineering Co. Inc.
1510 S. 14th St., Abilene

Dwight's
516 Tyler St., Amarillo

Odom's
Star Rt A, Box 32-C, Austin

Nixon Blue Print Co.
Wilson Tower, Corpus Christi

Greene Brothers, Inc.
1812 Griffin, Dallas

Don A. Carpenter Co.
P.O. Box 1741, El Paso

Bell Reproduction Company
907 Throckmorton, Fort Worth

Industrial Scientific, Inc.
1014 Taylor St., Fort Worth

Ridgway's
615 Caroline St., Houston

Panther City Office Sup. Co.
315 N. Colorado, Midland

Farquhar's Rocks & Minerals
134 Hollenbeck, San Antonio

East Texas Photocopy Co.
308 N. Broadway St., Tyler

UTAH
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Bring Your File Up to Date

Back numbers of the Earth Science Digest are still available. Some are in short supply and will soon be gone. If you like this issue of the Digest, you will find much to enjoy in previous issues. All numbers are 35 cents each, or 3 for $1. Below are listed the numbers with principal articles:

1946

November—Craters of the Moon National Monument, by H. N. Andrews, Jr. An Alaskan Gold Deposit, by Victor Shaw.

1947

January—Natural Steam Plant, by W. D. Keller. Alaska Gold Trails of '98, by Victor Shaw.

February—Michigan Minerals, by Henry P. Zuidema. A Missouri Ebb and Flow Spring, by W. D. Keller.

April—Famous Lost Mines, The Lost Dutchman, by Victor Shaw. Origin of Dolomite, by Kenneth J. Rogers.

May—Famous Lost Mines, The Lost Pegleg Smith, by Victor Shaw. What Camera for the Earth Scientist, by W. D. Keller.

June—Asbestos, by Eugene W. Nelson. Famous Lost Mines, The Lost Portal, by Victor Shaw.

July—Prospecting With a Geiger Counter. Famous Lost Mines, The Lost Dutch Oven, by Victor Shaw. Notes on Crinoid Research, by Harrell L. Strimple.

August—Nebraska's Marsupial Tiger, by H. P. Zuidema. Lake Superior Agate, Part I, by T. C. Vanasse. Famous Lost Mines, The Lost Arch, by Victor Shaw.

November—Zeolites for Lapidaries, by Richard M. Pearl. Famous Lost Mines, The Lost Tub, by Victor Shaw.

December—What Happened to the Dinosaurs, by Russell C. Hussey. Famous Lost Mines, The Lost Papuan, by Victor Shaw.

1948

January-February—Pollen Grains Write History, by Stanley Cain. Famous Lost Mines, The Lost Gunsight, by Victor Shaw.

March—California Tar Pits, by Dewey W. Linze. Meteorites, by Clell M. Brentlinger. Geology and the Microscope, Part I, by Arnold Goodman.

April—Sir William Logan, Father of Canadian Geology, Part I, by E. J. Alcock. Geology and the Microscope, Part II, by Jerome Eisenberg.

May—Fire Clay, by W. D. Keller. The Barite Group Minerals, by Richard M. Pearl. Sir William Logan, Part II.

June—Colorado Mineral Localities, by Richard M. Pearl. The American Federation and Earth Science Expansion, by Ben Hur Wilson.

July—Digging for Dinosaurs, by Horace G. Richards. How to Clean Mineral Specimens, by Mary Piper.

August—Devil's Tower, Wyoming, by H. P. Zuidema. A History of Fossil Collecting, Part I, by Richard L. Casanova.

September—Forms and Origin of Caves, Part I, by Charles E. Hendrix. Fulgerites, by E. Carl Sink. History of Fossil Collecting, Part II.

October—Forms and Origin of Caves, Part II. Water Witches by W. W. Schidler. History of Fossil Collecting, Part III.

November—Coal Age Flora of Northern Illinois, by Frank L. Fleener. How the Amateur Geologist Can Aid Science, by Gilbert O. Raasch.

December—The Gros Ventre Landslide, Part I, by H. P. Zuidema.

1949

February—The Moonscar Upon the Earth, Part I, by Harald Kuehn. Staurolite in Georgia, by A. S. Furcron. Bryce Canyon National Park, by Roger L. Spitznas.

March—The Moonscar Upon the Earth, Part II. The Geological Survey, by William E. Wrather.

April—Surface Geology at the Border of an Ice Sheet, by C. W. Wolfe.

May—Coal Geology, by Gilbert H. Cady.

June—The Search for Uranium, Part I, by W. S. Savage. Petroliferous Geodes, by Roger L. Spitznas.

July—Scenic Kansas, by Kenneth K. Landes. The Search for Uranium, Part II.

August—Soil Erosion in Southern Russia, by Wilhelm F. Schmidt. The Search for Uranium, Part III.

September—The Blister Hypothesis and Geological Problems, by C. W. Wolfe. The Green River Oil Shales, by Jerome Eisenberg.

October—Mt. Mazama and Crater Lake, by Jerome Eisenberg.

November—Geophysical Exploration With the Airborne Magnetometer, by Homer Jensen.

December—South Central New Mexico's Sinkholes and Craters, by Alfred M. Perkins.

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January—The Arkansas Diamond Area, by J. R. Thoenen, etc.

February—Archeology and Geology of Northwestern Alaska, by Ralph S. Solecki.

March—Constriction Theory of Earth Movements, by Rene Malaise. Geophysical Exploration, Part I, by Charles A. Wilkins.

April—Geology of the Mackenzie Delta, Arctic Canada, by Horace G. Richards. Geophysical Exploration, Part II.

May—Teaching Earth Sciences in Secondary Schools, Part I, by Jerome Eisenberg.

June—Geologic History of the District of Columbia, by Martha S. Carr. Teaching Earth Sciences in Secondary Schools, Part II.

July—Atomic Raw Materials, Part I, by Robert J. Wright. A Geologist Visits Europe, by Horace G. Richards. Teaching Earth Sciences in Secondary Schools, Part III.

August—Atomic Raw Materials, Part II. Sedimentation Studies at Lake Mead, by Herbert B. Nichols.

September—Fossil Localities of Northwestern New Mexico, by H. P. Zuidema. Geochemical Prospecting for Ores, Part I, by Jerome Eisenberg.

October—Potential Mineral Resources of Yukon Territory, by H. S. Bostock.

November—Geological Research in Finland, by A. Laitakari.

December—Potholes in the Navajo Sandstone, Zion National Park, by Roger L. Spitznas. The Origin of Sea Water, by Herbert B. Nichols.

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January—Evidence for a Primitive Homogeneous Earth, by Harold C. Urey. New Trilobites Described, by Herbert B. Nichols.

1952

July—Canon City Panorama, by Richard Pearl. Geologic Features of Twin Cities, by George A. Thiel. Chubb Crater, by V. Ben Meen.

September—Studies in Coal, by Frank L. Fleener. Minerals of Eastern Federation by H. L. Woodruff. Asteriated Gems, by Dr. W. B. S. Thomas.

EARTH SCIENCE PUBLISHING COMPANY
Incorporated
Box 1357, Chicago 90, Ill.

MISSOURI OZARKS

by Theo. J. Boente
4980 Neosho Street, St. Louis 9, Missouri

It is the purpose of this article to set forth some facts about the "Ozarks" region of Missouri, which, it is hoped will acquaint the reader with its major geological and physiographical features. Space will not permit detailed discussion of all localities and only such material will be introduced as is needed to present the region in its entirety.

Location

The "Ozarks" lie in five states: Missouri, Arkansas, Oklahoma, Kansas and Illinois. The total area is estimated at 50,000 square miles, of which 33,000 are in Missouri, 13,000 in Arkansas, 3,000 in Oklahoma and the remainder in Illinois and Kansas. The boundaries are mostly outlined by rivers, on the south the Arkansas, on the east the Mississippi, on the north the Missouri, on the west the Arkansas, Neosho and Osage. We will confine ourselves in this article to that portion of the "Ozarks" which lies in the State of Missouri.

General Character

The "Ozarks" is an area which has been elevated above the surrounding lowlands. That the region had been reduced to a peneplain prior to its uplift is evidenced by the even summits of the ridges. The average elevation of the summit of the highlands is about 1,300 feet.

The western part of the Missouri "Ozarks" is somewhat higher than the general average. This section is in the nature of a plateau, often referred to as the Springfield Plain. It is only slightly eroded, due probably to its remoteness from major drainage lines.

The eastern area is, however, maturely dissected into knifelike ridges and rough hill country. On the east in the area surrounding Ironton and Arcadia is a region of granite and porphyry knobs which reach a height of 1,700 to 1,800 feet.

On the west in Wright County are several elevations about 1,700 feet above sea level. These elvations are some 600 to 800 feet above the average Ozarks and constitute the only elevated areas on the old peneplain.

Except on the south and southeast the transition from plain to highland is very gradual. On the southeast the Mississippi embayment forms a clearcut boundary. This difference in character may be partially accounted for by the higher elevation of the glacial plain on the north. The Mississippi embayment is some 400 feet lower.

Structural Features

Structurally the Ozarks are a slightly domed uplift, the summit of which is formed by the St. Francois Mountains, out-cropping in St. Francois and adjacent counties. This mass of crystalline rocks forms the core upon which the sedimentary rocks rest and dip outward in all directions. In general, the dip is steeper on the margins than in the central areas.

The rocks have been little disturbed and remain in much the same position as when they were formed. There has been no folding, but in some areas extensive faulting has taken place. One of the faults in St. Genevieve County has a major displacement of some 1,000 feet.

Stratigraphy

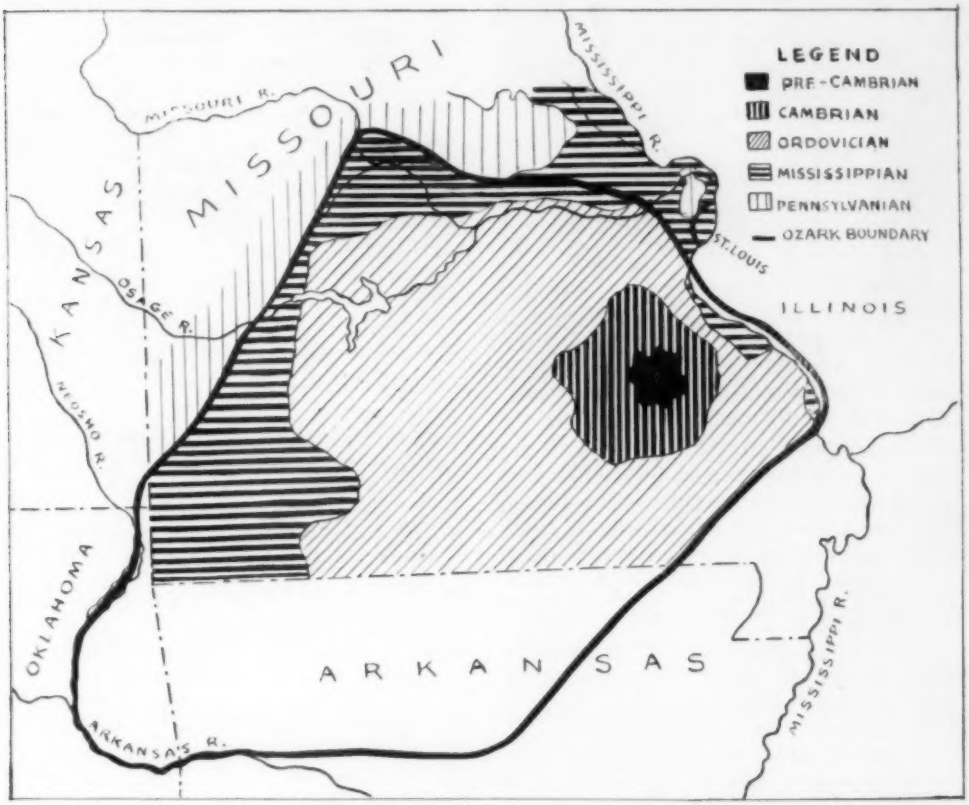
Algonkian System. The oldest rocks in the Ozarks belong to this system and are of igneous origin. They are composed of rhyolite-porphyry, granite and some basic dykes. The rhyolite-porphyry is the oldest member of this group and also constitutes the major part of the outcrop. The rhyolite contains phenocrysts of feldspar and quartz and is usually referred to as "the porphyry." The granite is predominantly red in color and is composed chiefly of quartz, orthoclase feldspar and some biotite.

A number of dark basic dykes cut both the granite and porphyry. The ex-

posures of this formation are merely the peaks of a mountainous mass, most of which is covered by sediments. It is probable that the overlying strata once covered the area to a much greater extent than at present. Inasmuch as the region has been exposed to erosion since Paleozoic time, it is logical to assume that a tremendous amount of material has been removed.

great importance, namely the Roubidoux and St. Peters. The other strata of this series consist largely of dolomites, limestones and some shales.

Mississippian Period. The strata of this period are predominantly limestones. The Burlington limestone underlies a wide area in the western part of the region and outcrops over considerable areas on the north.



Simplified geological map showing approximate boundary of the Ozark uplift and the areal distribution of the major formations.

Cambrian Period. Only the upper Cambrian is present. Its basal member is a sandstone, the La Motte, which is succeeded by a number of formations made up predominantly of limestone of dolomitic character.

Ordovician Period. Rocks of this system outcrop over a greater surface area than any of the other major divisions present in the Ozarks. Two sandstone members of this period are of

Pennsylvanian Period. The Pennsylvanian period is represented by the Cherokee formation on the west and north border region. Extensive areas of outcrop also extend into the north central part of the highland.

Mineralogy

In the Ozark region are some of the most heavily mineralized areas in the world. The lead mines of southwest Missouri have been in operation for

over 200 years and are still producing in great quantities. On the west in the Joplin area of no less importance are the zinc and lead deposits. Mineral specimens of this region are of exceptional quality and are in great demand by collectors.

In the igneous area of the St. Francois Mountains are extensive deposits of hematite which were once of great importance and are still being mined.

In the north central section occur the filled "sinks" in which are found iron ore, pyrites, barite and the refactory clays which are one of Missouri's greatest natural resources.

Located in St. Francois county are the large barite deposits. The barite occurs in crested form and good specimens of this type of crystallization may be obtained here.

Near Fredericktown a small percentage of the cobalt mineral siegenite occurs in the complex ore. In this ore may be found a number of minerals of which galena, pyrite and chalcopyrite are present with the former predominating.

The tungsten mineral huebnerite occurs in some quantity at Silver Mine in a pegmatite containing lead and silver. A great number of minerals have been found here, some of which are flourite, zinnwaldite, pyrite and covellite.

Characteristic Features

Throughout the "Ozarks" the chemical action of groundwater has sponsored a great underground drainage system. Large areas are underlain by dolomites and limestones which are easily soluble in groundwater. Where the subsurface streams emerge we have the enormous springs, such as Big Springs near Van Buren.

The many caves of the "Ozarks" have been formed in the same manner. Several of the caverns have been commercialized and are visited each year by thousands of tourists.

Most of the dolomites and limestones contain large amounts of chert. As weathering proceeds the chert being highly resistant to chemical action, remains in the residual clay and mantle rock. As a result, chert is found in abundance throughout most of the region on the hills, ridges and in the beds of streams. Occasionally pieces of chert are found which have attractive coloring and make good cutting and polishing material.

In the St. Francois Mountain area are beautiful streams flowing through gorges cut in the granite and porphyry and locally called "shut-ins." Near Graniteville are the famous "Elephant Rocks," a series of hugh granite boulders resting on a domed granite knob.

To those who like scenery, those who are lovers of nature and earth science, the Ozark Region will not be disappointing.

In writing briefly about a subject as big as the "Ozarks" it is a difficult task to choose from a multitude of facts and theories those items which best serve to describe the region as a whole. It is hoped that the foregoing will not confuse but will serve as an introduction to further study of this most interesting region.

* * *

ODE TO A TRILOBITE

Oh, stony little trilobite
With beady little eyes;
You've lain asleep beneath the ground,
Come hence, it's time to rise.

Awake, behold the pebble pup
With hatchet in his hand;
Alas you soon will be unearthed
From bed of rock and sand.

Do not tremble in your fright,
For these are humans, dear;
They treat their treasures tenderly,
You have no cause for fear.

He's bearing down upon you now,
A smile is on his face;
Methinks that he has spotted you,
He's quickening his pace.

Oh, stony little trilobite
With beady little eyes;
No longer comfy in the ground,
Poor thing, you *had* to rise!

PEGGY ALLAWAY

* * *

The Coronation Crown Jewels fully illustrated in the May issue.

James L. Kraft

It is with a real sense of loss that we record the death of James L. Kraft on February 16. He was certainly the best known of American amateur lapidaries; was one of the first to become a life subscriber to the Earth Science Digest, and by his example, his lectures, and his many acts of kindness to other hobbyists, did much to increase interest in gem cutting.

A deep religious conviction and driving energy were the forces that took Mr. Kraft to success in the several fields in which he was interested. As a boy in Canada he had known bitter poverty; he was so near sighted that until a chance summer visitor noticed his plight and bought him spectacles he had never been able to see the ground in front of him. As a young man he came to Chicago and put his few dollars into a grocery route, selling cheese. From this enterprise grew the internationally known Kraft Foods Company of which he was president and chairman until his retirement several years ago.

The artistic imagination which made Mr. Kraft the virtual founder of the packaged foods industry, foundation of the supermarkets and the big food processing firms of today, also found an outlet in his lapidary interests. Twelve years ago a chance pebble picked up on a beach stirred him into action. He became convinced that jade could be found on this continent, and through a system of subsidizing prospectors—grub-stakes—he was influential in bringing about many of the initial discoveries of jade in Wyoming and, later, in California, where he bought the Chan jade site in Siskiyou county.

Packages of rough gem material poured into his office in Chicago and his home in Wilmette, a suburb, sent by his prospectors, by far-flung Kraft Foods representatives, and by friends and grateful associates in the hobby. Mr. Kraft, with the concentration that seems to be a characteristic of success, devoted his increasing leisure to cutting gem stones, leaving club affairs, mineralogy and such interests to others. He gave jade rings and pocket pieces to friends and to employees as rewards for good work; he made up numberless pins for members of Mrs. Kraft's Sunday School classes, and he built up traveling displays of polished gems to stimulate interest and for his lectures before many mineral clubs, church groups and other associations.

An account of his lapidary beginnings and of his love for jade is embodied in a book, "Adventure in Jade," which he wrote in 1947. Among his orginal lapidary steps was introduction of the belt sander for sanding and even polishing gems, and he also had a hand in bringing out the now popular oscilating diamond saw machine.

The highlight of Mr. Kraft's lapidary interests, and perhaps of his religious interests, too, was dedication last fall of the fabulous jade window which he had imagined and brought into being with the help of Mr. E. A. Williams of Elkhart and others. This window, described in the November issue of the Earth Science Digest, is placed in the North Baptist church, where its hundreds of superbly finished pieces of American jade of several colors may be admired.

Mr. Kraft, besides being active in the Sunday School and the board of this church, was also nationally known as a Sunday School leader and as assistant treasurer of the National Council of Churches of Christ in America. (RPM)

Geologists Establish Award for Outstanding Teacher

The Association of Geology Teachers, during its recent annual meeting in Boston, established an annual award for outstanding excellence in the teaching of Geology. The award is to be known as the Neil A. Miner Award of the Association of Geology Teachers, and is to be granted "for eminence in stimulating interest in the earth sciences." The medalist is to be selected by an award committee from a list of names submitted annually by members of the Association. He need not be a member of the Association nor engaged in formal teaching in college or high school.

The award is named for Dr. Neil A. Miner, the late Professor of Geology at Cornell College, Mount Vernon, Iowa. Miner was one of the charter members of the Association at the time of its formation fourteen years ago, and for many years was a leading small college geology teacher.

As is true in other sciences, various national geological groups present awards for outstanding achievements in *research*. The Neil A. Miner Award will be the first recognition of meritorious accomplishment in the *teaching* of geology. Several other sciences have similar awards.

Officers of the Association, elected at the Boston meeting, are: president, David M. Delo, president of Wagner College, Staten Island, New York; secretary, Ralph Digman, Harpur College, Endicott, New York; vice-president, Joe W. Peoples, Wesleyan University, Middletown, Connecticut; treasurer, Gerald Friedman, University of Cincinnati; editor, William Read, Lawrence College, Appleton, Wisconsin.

Answers: **Test Your Knowledge!** Check the ones you have correct.

a.—(1) Hard coal. Highly mineralized, containing from 85 to 90 per cent carbon.
b.—(1) The transparent variety of quartz crystal.
c.—(1) Water deposited (solution) calcium carbonate, usually found in caves, also about the mouths of springs.
d.—(1) Produced through the agency of heat (high temperature).
e.—(1) Rock consisting of tightly cemented rounded fragments, pebbles, etc.
f.—(1) A frothy, cellular, glassy lava. Pumice stone.
g.—(2) Nuggets of both native copper and silver metal intimately associated,—in contact.
h.—(2) An imaginary line passing through or connecting analogous opposite points of a crystal about which the parts are symmetrically arranged.
i.—(2) The property of tenacity which permits a substance to be pounded or rolled into thin sheets.
j.—(3) Natural mineral wool, blown from highly molten lavas by high winds across the vents of volcanoes. i.e.: Mount Pelee.
k.—(3) The excrement of birds, (or other animals) rich in phosphates and nitrogenous matter, deposited in abundance on some coasts and islands, and in caves.
l.—(3) Rocks formed by the cooling of molten magma deep within the Earth's crust. Usually crystaline.

JUNIOR ESSAYS

In closing the junior essay contest of the American Federation of Mineralogical Societies, the entrants were informed that they could have their essays submitted for publication to the magazine of their choice. These two chose The Earth Science Digest.

America's Valuable Resources Are Kept Hidden

America is rich in her bountiful supplies of untapped natural resources. Much of this is hidden simply because there are so few who are qualified to identify the minerals and gem stones we see around us every day. These hidden treasures are indeed a challenge to those of us who will but study the minerals and natural resources within our own boundaries.

We are paying enormous sums every year to import many of the very minerals we practically walk over every day, and it is an extravagance when America is abounding in stupendous untapped deposits of her own. The very ores and other important resources that we are importing are quite likely the ones most abundant if we but knew.

We Americans pride ourselves on being a highly educated nation. That is very true and still the early American Indians and the natives of some of our poorly educated nations are far better qualified to identify the precious stones and minerals than are we.

This knoweldge is handed down from generation to generation and their ability to pick up gold, diamonds, and other important minerals and know its substance is an art that we lack.

Every day we pick up interesting stones or see rusty looking ledges in cliffs, discolored with the precious minerals contained in their depths; we discard the stones and promptly forget about the rusty ledges for lack of knowledge and facilities for helping us to identify them.

The sight of a beautiful rock or some unusual phenomena in the earth's formation is awe inspiring, and are the small gates through which desires are awakened in us to know more about how these structures were formed and the minerals they contain.

Since rocks provide the make-up of the world and supply many of the things essential to our everyday living, it is important that we learn at early age the art of classifying them. To enjoy the earth we must know it. Although rocks are ancient the science that deals with them is comparatively young and enjoyed by a few who are fortunate enough to study these sciences.

America has in hand the resources needed to build a prosperous, dynamic future, if she will but use the talent that must remain latent for lack of teachers and facilities for helping to educate those who desire it in the important fields of Geology and Mineralogy.

May the time come when these subjects are more widely studied and facilities for helping to identify our minerals and precious treasures more widely distributed, so that we may help our America to become independent and rich in her own natural resources.

SHIRLEY ANN STANLEY
1638 Jefferson Park Rd.
(Age 11) Waynesboro, Virginia

* * *

Rocks are very beautiful and many people like them as they are very colorful that is why it is my hobby.

I like petrified wood about the best of all and to some people maybe fools gold would look like gold, but if you know rocks you can tell the difference.

I know how to pan gold and all the fools gold washes away and the gold is so heavy that it stays on the bottom of the pan.

I also have a few other rocks in my collection. I have copper that looks like a rainbow, iron pyrite looks like gold, aragonite looks like cauliflower, crystals that look like diamonds, Apache tears look like black marbles, desert roses that look like roses and can be painted and worn as pins.

I have a small collection and bye and bye I hope to get more.

SHELDON GOODKIND, (Age 6½)
89 West Lewis, Phoenix, Ariz.

Exotic Crystal Forms

In nature, conditions under which crystal growth occurs are seldom ideal,—and, as might be expected, under controlled conditions, as in the laboratory, more perfect examples may properly be looked for as the rule rather than the exception.

Crystals are formed, or grow, whenever the physical state of the parent material is such that it becomes possible for its molecules to migrate slowly, and thereby arrange themselves upon complete solidification, into an orderly pattern, governed of course by the shape of the individual molecules themselves, as well as by their polarity.

The general conditions under which crystallization takes place are in the main well understood. Crystals may occur upon the slow cooling of some magmatic (molten) mass upon its solidification, and under some circumstances even within a solid itself. They may also form from within a solution upon its cooling, or when by evaporation of the solvent it becomes supersaturated, and being unable longer to carry its excess burden, thereupon throws it down as a precipitate, which under favorable conditions will form crystals.

The form or comeliness of the resultant crystals is modified by a number of things, and naturally perfection is achieved only when all these conditions are approaching the ideal situation. Conversely as conditions become less and less favorable, the situation is eventually reached where crystal growth is greatly interfered with, and as is to be expected, when certain limits are arrived at, prevented entirely.

Pressure, temperature, lack of space, or an unsatisfactory or crowded situation may be factors controlling or interfering with the growth of the crystals. The presence of impurities or foreign matter is also an important factor which greatly influences the manner of crystallization.

We are at present concerned with the matter of impurities. These may be in the nature of dissolved foreign material existing in the solution itself, or perhaps minutely small particles of solids of various kinds carried in suspension mechanically in the solution.

As the foreign matter varies in size and quantity, becoming more and more pronounced in the solution, crystal growth is gradually affected, and progressively modified from the normal. As this struggle increases their perfect form becomes more and more distorted, resulting in certain exotic but more or less familiar forms.

So-called "rose formations," "pyrite flowers," "sand crystals," and the like are the resultant product of the situation, and when these particles become finer and finer, or clay-like, approaching molecular size, we sometimes encounter many strange variations of crystal growth, such as those which are described and discussed in the article by Mr. Waskey. (See pages 2 and 3.)

In the forms illustrated, the sizes of the foreign particles range from clays to the finest sands imaginable, and in this instance the crystallizing medium is calcium carbonate (calcite), as is shown by their free effervescence when treated with cold dilute hydrochloric acid, carbon dioxide gas being liberated. Such formations are usually as interesting as they are different.

BEN H. WILSON

NEW EXECUTIVE DIRECTOR

It has been recently announced that Dr. Robert W. Webb, Professor of Geology, Santa Barbara College, University of California, has accepted the appointment of the joint position of Executive Director of the American Geological Institute and Executive Secretary of the Division of Geology and Geography of the National Research Council, effective as of Jan. 1st.

This position was made vacant upon the resignation of Dr. David M. Delo, last summer to become President of Wagner College, New York. Dr. Webb will be on leave of absence from his college post in California. Secretarial offices of the A. G. I. are located at headquarters of the National Research Council, 2101 Constitution Avenue, Washington, D. C.

Midwest Federation Bulletin

Edited by Bernice Wienrank, Staff Member

St. Louis Mineral and Gem Society will be host to the Midwest Federation's 13th annual convention, to be held at the St. Louis University High School, 4970 Oakland Ave., St. Louis, Mo., June 26-28.

Plans are underway to make this one of the largest and most successful rockhound conventions ever held. There will be exhibits from all Midwest Federation societies, set-ups of lapidary equipment in operation, displays by mineral dealers, etc. Numerous field trips are scheduled. Lectures on geology, mineralogy and lapidary will be given by outstanding authorities in the fields.

The Federation urges all club members to keep the dates in mind and plan to attend. Clubs, of course, are expected to plan their exhibits well in advance.

Chicago Lapidary Club on January 8 heard William Richards of the Black Light Products Co. speak on "The Magic of Fluorescence." Mr. Richards gave this important warning: Never use a germicidal lamp to produce fluorescence without properly shielding it. The direct rays from the lamp can cause severe eye burns, which are not felt until the following day. To be safe — use a true black light, which has no harmful rays.

CLC lost its meeting hall, mimeograph equipment and exhibit case when fire caused $20,000 damage to the Grand Crossing park fieldhouse on January 21. The central portion of the building, including the lapidary shop, was destroyed.

Marquette Geologists Association at its January meeting viewed Paul Running's beautiful color films of the Grand Canyon and the Petrified Forest. MGA member Lt. Joseph Mandarino, who was home on leave, spoke on "Mineralogy."

Wisconsin Geological Society has presented the science division of the Milwaukee Library with a gift subscription to *Earth Science Digest*. Milton Drescher, librarian in charge of the science division, states that *Earth Science Digest* is an important addition to the library because of its great regional interest to Wisconsin readers and the excellent reference material it provides students of nearby Marquette University and University of Wisconsin.

Earth Science Club of Northern Illinois has added two new features to its regular meetings: a swap table and a "what-is-it?" table. Members bring their surplus specimens to the swap table and trade among themselves. At the "what-is-it?" table they may have their unknown specimens identified by a board of experts. Sometimes the experts are stumped!

Central Iowa Mineral Society was scheduled for January 9 to hear Mel Lumbard speak on "Crystalography." A large crystal exhibit was also planned.

A late fall field trip was made by CIMS to Fox River in southeastern Iowa for geodes. The most unusual find was made by Dency Brown, who dredged up from the bottom of the river a large geode, open at one end, with a live 4½ inch catfish wedged inside.

Illowa Gem and Mineral Society will hold its annual gem, mineral and fossil exhibit May 1-31. The show, one of the largest non-competitive shows of its type in the middle west, is expected to draw an even larger crowd than its last year's record of 4034 visitors. Dealers in rockhound supplies and manufacturers of lapidary equipment are cordially invited by IG&MS to display their wares free of charge except for transportation costs. If interested, write to the Illowa Gem & Mineral Society, % The Davenport Public Museum, Davenport, Iowa.

Michigan Mineralogical Society has added to its library a file of clippings concerned with fossil, mineral and gem collecting areas in the U.S. They are classified into groupings for North Central, South Central, Eastern and Western states. MMS members are sure to

find these a valuable guide in planning field trips.

Chicago Rocks and Mineral Society recently heard Dr. Donald Boardman, professor of geology at Wheaton College, speak on "The Use of Accessory Minerals in Stratigraphy." Dr. Boardman, who illustrated his talk with colored slides, explained how minerals reveal the earth's geologic history and furnish important information to the oil and mining industries.

Akron Mineral Society will meet at the home of Mr. and Mrs. Norman Nye, Cuyahoga Falls, Ohio, on March 21, to view Mr. Nye's collection of polished stones and to hear a discussion on "Malachite" by Frank E. Mabry.

AMS will hold two exhibits during April and May. The first will be held at the Akron Sportsman Show, Goodyear Hall, Akron, Ohio, April 13-19. The second exhibit will take place at the Akron Museum of Natural History, from April 20 to May 4. An "assembly line" demonstration of gem-cutting will be featured as well as displays of minerals and lapidary work.

Joliet Mineralorist Society gathered recently to view a fine series of kodachrome pictures of the last two annual conventions of the American Federation of Mineralogical and Geological Societies. The slides were shown and commented on by Thomas Scanlon, president of the American Federation, who is also a past president of the Midwest Federation. The 1951 convention was held in Tacoma, Washington, and the 1952 convention in Canon City, Colo.

Nebraska Mineral and Gem Society's last field trip of 1952 was made to the Snyderville quarry, located between Weeping Water and Nehawka, Nebraska. Fossils are found in abundance in this area, which has been covered by ocean water at least five times in geologic history. From this trip, NM&GS members returned with hustedia, a shell smaller than a lady's little finger nail and tiny fusulina, which looks like grains of rice. Brachiopods such as enteletes, meekella, chonetes, dictyoclstins and derbya crassa were less plentiful. A neospirafer tripicatus, 2½ inches in diameter, was picked up. Horn coral and crinoid stems were also found, both in place and weathered out.

Rochester Earth Science Society recently attended an open house party in the new home of Mr. and Mrs. Harold Whiting. The Whitings have a well displayed collection of minerals in their basement. They like to show it to fellow rockhounds and are pleased when visitors to Rochester look them up. Thirty-five members were present at the open house.

The Midwest Federation Exchange, managed by Frank Sadilek, provides members of the Midwest Federation with an opportunity to trade fossils, minerals, crystals, gems, etc., with each other.

The Exchange list, begun in 1950, now numbers about 200 and is still growing. The list is published periodically with a bulletin aptly entitled "Trade-Wins." The bulletin, which is edited by Mr. Sadilek, contains many fine articles, "thumb-nail" personality sketches and news about members of the Exchange. It is worth much more than the 15c charged per issue, which barely covers mimeographing and mailing expenses.

For full details and an application blank, write Frank J. Sadilek, 1308 West 42nd St., Des Moines 11, Iowa. Enclose a stamp to cover postage.

— NEWS OF OTHER SOCIETIES —

San Diego Lapidary Society insures itself an active membership by requiring each member to display five new pieces of lapidary work and participate in at least one field trip a year. Those who fail to comply are dropped from the membership roll unless they have a good excuse.

Humboldt Gem and Mineral Society recently wrapped slabs and let its juniors draw for them. It is hoped that youngsters who own slabs of gem-cutting materials will become interested in lapidary work.

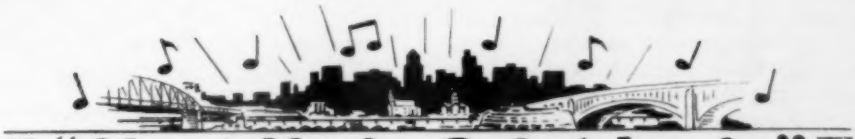
Oregon Agate and Mineral Society will be host to the 1953 Northwest Convention, which will be held in Portland, Oregon, September 5-7. OAMS has al-

ready commenced work on the program which includes collecting trips, sightseeing trips, club displays, special displays, lectures and a banquet.

Pennsylvania Mineralogical Society is humming with activity as its members prepare gems for the society's Lapidary Exhibit, to be held March 15 at the home of Russell Bell, 320 Kent Road, Bala Cynwyd, Penn. It is hoped that each "pebble polisher" will show at least one stone.

Colorado Mineral Society recently heard Michael Gunnell, creator of the "Gunnell Comparative Crystal Collections," discuss "Crystals and Psuedomorphs." Mr. Gunnell's idea for crystal collections for comparison was born when he observed that the mineralogy textbook pictures left much to be desired and that models of crystals were made of painted wood. Mr. Gunnell decided to collect crystals as nearly perfect as possible, code, number and mount them scientifically and in accordance with recognized procedures. Thus, in 1944 the first "Gunnell Comparative Crystal Collection" came into being. It contained 20 crystals and was sold for $15.00. He now carries eight lines of natural comparative and descriptive crystal collections.

Ye Old Timers' Club president, Earl Van Deventer, proposes that the age limit for membership in the club be lowered from 60 to 50 years of age. He states, "Surely, after one has reached the age of 50, he is starting down the hill, and many will never be able to enjoy Ye Old Timers' fellowship if they have to wait until they are 60." Members will be asked to vote on this amendment to the constitution.



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***Convention Chairman* — K. E. GIBBONS**

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ALPHEUS F. WILLIAMS

In December of 1952 there occurred the death of Alpheus F. Williams, long time general manager of DeBeers Consolidated Mines, Ltd., in South Africa. He was also the author of The Genesis of the Diamond, a two-volume work which became a geologic authority in its field. Published in 1932, it became the complete record of all information of a mining nature regarding diamond operations in Africa, and describing the geological formation, especially the origin of the kimberlite. At the same time he made an extensive collection of diamond crystals with the object of determining the condition under which the diamond crystals grow.

His father, Gardner F. Williams, who preceeded him as general manager wrote an extensive two-volume work in 1906, entitled The Diamond Mines of South Africa. It is a historical, economic and technical account, as well as a history of the development of the DeBers group of mines.

Classified Ads — Rates: 35 cents a line, 3 lines for $1.00.

RUBBER STAMPS MADE TO ORDER. De luxe knob handle, visible label, cushion mounted. Three lines up to three inches long $1.45. 1000 embossed business cards $3.95. Write for sample. OFFICE SPECIALTIES, 2364 N. 58th, Seattle 3, Washington.

QUARTZ CRYSTALS var. "Herkimer Diamonds." Matrices, groups, etc. on approval. CLAUDE D. SMITH, Box 291, Geneva, N.Y.

TONOPAH, NEVADA, is where C. C. BOAK lives, with his outstanding, scientific, world-wide collection of MINERAL, GEM and SEMI-GEMSTONE species — CRYSTAL groups, ROCK PICTURES, Etc. Visitors welcome. C. C. BOAK, 511 Ellis St., Tonopah, Nev.

BOOKS FOR COLLECTORS AND LAPIDARIES—*Gem Trail Journal* for your field trips, price $2; *Indian Silversmithing* is an excellent work for the lapidary, $4.75; Dake's Gem Cutting $2; English's Getting Acquainted with Minerals $4.50; Dana-Hurlbut's Minerals and How to Study Them $3.90. Ask for other titles. Paul VanderEike, Rt. 2, Box 1168, Vista, Calif.

ROY OFFERS 3/16" slabs in the following materials: Blue Tiger's-Eye 50c inch; Rhodonite, pink and black 50c; Calfornite 50c; Palm Root, California 25c; Oregon Moss Agate 25c; Honey Onyx 20c; Silver Sheen Obsidian 20c; Golden Sheen Obsidian 20c. Please add postage. ROY'S ROCK SHOP, Box 133, Trinidad, Calif.

U.S. GEOLOGICAL SURVEY BULLETINS, other publications, back numbers bought & sold. Also files of periodicals. J. S. Canner & Company, Inc., Boston 19, Mass.

SPECTROSCOPE for quick ore and mineral identification. Postpaid $3.00. CUTTING TEC. CO., Los Altos, Calif.

GENUINE AND SYNTHETIC STONES accumulated from our vast gold-buying. Approval shipments sent collectors upon request. Advise your needs. B. LOWE, Holland Bldg., St. Louis 1, Mo.

ASSORTED GEM SLABS $3.00 lb. plus postage. ART OF GEM CUTTING, THE AGATE BOOK, LAKE SUPERIOR AGATES $2.00 each postpaid. Price list on request. KEWEENAW AGATE SHOP, Ahmeek, Mich.

PERFECT FERNS .40—$3.50; GOLD nuggets ¼" $1.00; Canada WERNERITE 1" .25, 2" .55, 3" $1.25; fluor. CAVE ONYX 1" .20, 2" 50, 3" $1.00; PLATINUM BLACK SAND vial .50-1.00; OBSIDIAN & LAVA 1" .15, 2" .35, 3" .70; Franklin fluor. 1" .20, 2" .45, 3" .95; For complete free information send to THE MIDWEST SHOP, 9709 S. Prospect, Chicago 43. Prices include postage. All guaranteed. Mail orders only. Sorry.

"OVERLOOKED FORTUNES" in the Rarer Minerals! Find War Minerals. Here are a few of the 40 or more you may be overlooking: Uranium, Vanadium, Columbium, Tantalum, Tungsten, Nickel, Cobalt, Tin, Molybdenum, Germanium, Platinum, Palladium, Bismuth, Titanium, Chromium, Antimony, Mercury, etc. Cassiterite now $1,000 ton; Bismuth $1,500 ton; Columbite $2,500 ton; Tantalite $5,000 ton; Tungsten $3 pound; Platinum $90 ounce, etc. Now you can learn how to find, identify, and cash in on them. Send for FREE copy "Overlooked Fortunes"—it may lead to knowledge which may make you rich! Duke's Research Laboratory, Box 666, Dept. C, Hot Springs, New Mexico.

BARGAIN Jewelers 4X Eye-Loop, frees hands for examining minerals, etc. $2.50 value, $1.25. Anelag, Box 141ES, Rochester, Wisconsin.

KNOW YOUR ROCKS AND MINERALS. Learn how to identify with our charts and collections. 26 different charts and over 100 collections. A new, free catalog is now ready. The company is also interested in buying rocks and minerals, not the fancy types but good enough for study purposes. We will answer all letters received. Wright's Mineral Service, 2720 1st Ave. So., Minneapolis, Minn.

CABOCHONS • MOUNTINGS — Sterling silver earring mountings; very sturdy: plain, modern lines. 16x14mm @ 2.00 pr.; 14x12 @ 1.75; 15 mm rounds @ 1.85; 12x10 @ 1.60. Cabochons, 16x14: Snowflake Obsidian 50c each; bright yellow Onyx 60c; bright carnelian Onyx 70c; bright green Onyx 75c; Rose quartz 1.00; jade-greenAventurine 1.50; opaque, light green Jadeite 3.00; opaque, dark green Jadeite 4.00. 100% refund for returns made within ten days. C.O.D. or 5% discount for cash with order. TAKOMA GEM COMPANY, P.O. Box 4344, Takoma Park 12, Maryland.

(*Continued on Page* 50)

SERPENTINE (*from p. 6*)

of interest, but the detailed instructions for reaching the locality were sufficiently misleading, even to one fairly conversant with the locale, that it was easier to read them backwards and arrive at the spot, hind-end foremost, by way of the bridge across Octoraro Creek, and the entrance above it directly to Mr. Wood's residence! The writer made this trip last summer, and the sad conclusion is that there is nothing now to be found among the imposing list of minerals attributable to this spot, other than the main body of chrome ore, save a few pieces of brucite, described by Duersmith as "silver white to delicate green foliated masses, resembling mica in appearance." There is the one consoling thought that many of the catalogued minerals lie buried deep under hundreds of tons of debris on the dumps which only a bulldozer could disclose.

From a geological standpoint, the occurence of the serpentines in Maryland is part of the igneous crystalline intrusive rocks to be found in the famous Piedmont Plateau, a distinct area lying between the Appalachians on the west and the broad Coastal Plain on the east, which may be said to begin in Maryland at the eastern base of the Catoctin Mountain. The mineral constituents are olivine and pyroxene forming serpentine in its various forms and shading off into talc. The serpentines form part of a broad band of metamorphic rocks running generally in direction from southwest to northeast across the State from the Potomac River to the Susquehanna River, and doubtless continues in a northeasterly direction across Pennsylvania, Delaware and into New Jersey, where the serpentines also occur.

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TERMS: C.O.D. only until credit established. No shipping charges if prepaid. Money on stock items refunded if they do not meet with satisfaction and they are returned within five days in the same condition they were sent.

STAR GARNETS

Non-oriented cabochons showing definite 4 rayed star in direct light. These stones can be easily recut to center the star. Use the point where the two lines cross as the orienting point (center of cabochon to be re-cut). Present weight 5 to 10 cts. $6.00 each. 3 for $15.00. Better quality $8.00 each—3 for $20.00.

We have a few 6-rayed star garnets at $30.00 to $50.00 each.

EMERALD

Carved flower, 21 mm. round, 10 mm. high, Indian material, good color—$75.00.

Carved crown, carved on both sides with leaf design 38x29 mm., 12 mm. high. Like above 91.70 ct. $130.00.

CABOCHON round and oval dark green color. 3 to 4 mm. $2.00 each—3 for $5.00; 4 to 5 mm. $3.00 each—3 for $8.00, and 5 to 6 mm. $5.50 each—2 for $8.00.

Commercial color 4 to 12 cts. $4.00 per ct.

Extra fine color 2 to 5 cts. $25.00 per ct.

Green quartz 1 to 3 cts. $1.50 per ct., 10 ct. lots $12.00, 25 ct. lots $20.00.

PERIDOT

20x15½ gem, perfectly clean, octagon cut; finest color, $17.00 per ct. Weight 31.85 cts.

17 mm. round brilliant cut 22.30 cts.; perfectly clear except one cleavage streak $11.00 per ct.

5 stones: 16x10 octagon emerald cut 11.30 ct.; 16x13 oval brilliant cut, weight 12.70 ct.; 14x11 oval brilliant cut. 8.70 ct.: 14x16 shallow brilliant cut heart 8.20 ct. All these stones with slight veils or flaws—$9.50 per ct.

Small rounds, brilliant cut ¾ to 3 cts. $3.00 per ct.

Tear drops: faceted matched pairs on bottom 5-6 mm. wide. Up to 8½ mm. $4.00, 2 for $7.00. Up to 10½ mm. $5.50, 2 for $9.50.

Genuine Faceted AMETHYST — Ferbruary Birthstone

Heart shape, dark Brazilian near Uruguay material 20-35 cts. each—$1.90 per ct. Some stones have slight interior veils or imperfections. A few extra dark stones Siberian color $4.00 per ct.

Oval brilliant cut same material as above 12 to 20 cts.—$1.75 per ct., 18-40 cts. $2.25 per ct.

Emerald cut perfect cut flawless dark color octagon 6-12 cts.—$1.40 per ct.

Extra deep color 12-18 cts.—$1.75 per ct.; 16 to 30 cts.—$3.00 per ct.

Uruguay amethyst, deep Siberian color, 2-5 cts. oval or octagon—$4.00 per ct.

Commercial quality all dark perfect emerald cut; in a few sizes oval, clean—

9x7	mm. approx. 2.5 cts.	$1.50—2 for	$2.50
10x8	mm. approx. 3.5 cts.	$2.00—2 for	$3.50
11x9	mm. approx. 5 cts.	$3.25—2 for	$5.75
12x10	mm. approx. 6 cts.	$4.00—2 for	$7.25
14x10	mm. approx. 8 cts.	$5.00—2 for	$9.00
14x12	mm. approx. 9 cts.	$6.00—2 for	$10.50
16x12	mm. approx. 12 cts.	$8.50—2 for	$15.00

Heart shapes like above approx. sizes 10x8, 12x10, 14x12.

Orchid color (dark lavender) clean oval brilliant cut or octogan "French" split cut. This lot of more than 7,000 cts. contains a few golden citrines at the same price.

12x10	$2.25 each	— 2 for $3.75 — 5 for	$8.00
14x10	$2.50 each	— 2 for $4.00 — 5 for	$8.50
14x12	$3.75 each	— 2 for $6.50 — 5 for	$13.50
16x12	$4.75 each	— 2 for $8.50 — 5 for	$17.00

DEALERS ATTENTION: Keystone price on above 500 ct. lot .28 per ct.—200 ct. lot .35 per ct.—50 ct. lot .45 per ct.

Genuine Faceted AQUAMARINE — March Birthstone

64 ct. dark blue octagon emerald cut gem mounted in platinum with 6 diamonds approximately 10 points each $1,500.00 plus tax.

2 emerald cut, 60 cts. each; dark color; real gems—$10.00 per ct.

5 gem stones as above 20 to 45 cts. each $9.00 per ct.

Dark commercial color from 4½ to 50 cts. All octagon emerald cut, perfect—$4.50 per ct. Same as above, slightly lighter color—$3.50 per ct.

Commercial, regular clean light emerald cuts as used in the jewelry trade for birthstone rings.

9x7 $1.50 — 2 for $2.50
10x8 $2.00 — 2 for $3.50
11x9 $4.00 — 2 for $7.00
12x10 $5.00 — 2 for $9.00
14x12 $8.50 — 2 for $15.00

Slightly better color, 16x12—$15.00, 18x13—$20.00 and $30.00, 20x15—$35.00 and $50.00.

We carry a few heart and pear shapes at $2.50 to $5.00 per ct.

Madagascar stones, darkest available aquamarine blue, color of dark Montana sapphires. 3 to 4 mm. round brilliant cut .40 each, 6 for $2.00; 4 mm. square $1.50 each, 3 for $4.00.

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January 15, 1953

Dear Editor:

We read your gripe in the January issue and agree with you, but the story on page 31 of Mineral Notes and News, October, 1952, gives the other side of this story.

Being new Rockhounds of only two years we have found the information on rock spots low and only the old or worked out ones given. We joined the state mineral club and that helped very little. Just two people can be given credit for helping us find our way and for my daughter (11 years) winning her Girl Scout Rock and Mineral badge. These people are Mrs. Carrie Heller and Mr. Wm. Bingham, both of St. Paul.

Hope you feel the same about the person in the story referred to above as we do. There is all too often one who will spoil things for many.

Yours truly,
HERMAN, VIRGINIA, AND
GINGER HOGREFE,
1135 Hudson Road
St. Paul 6, Minn.

"Introduction to Economic Geography," a new course, is being offered by New York University's Division of General Education in its adult evening study program.

Designed for persons without previous training in geography or economics, the course deals with material resources, industries, and commerce, viewed as a background for world affairs.

Topics to be discussed include distribution and use of minerals, fuels and water as a source of power; world centers of iron and steel products; global significance of nonferrous metals (copper, lead, aluminum, manganese); agricultural and animal production; forest and forest products; and world trade centers and trade routes.

* * *

ERRATUM—ERRATA

On Pages 3, 4, and 5 of the January issue, "Makite" in the captions of the pictures should have been "Unakite."

ARGONNE (*from p. 10*)

struction is a reactor engineering building and a structure to house the laboratories' atomic piles.

Smaller buildings include the experimental animal quarters where thousands of mice, living under ideal conditions of sanitation, temperature and humidity are used by Dr. Howard Vogel in experiments on the effect of neutrons and gamma rays on animal tissue.

Located nearby is the Experimental Waste Processing building, where experiments are carried on to find cheaper and more efficient methods of disposing of materials contaminated by radioactivity. The equipment in the building cost $180,000 but already has saved $300,000 a year by finding new methods of disposing of wastes.

It is the boast of the men working in the building that the air they discharge back into the atmosphere is purer than that they draw into their incinerators.

Also in this group is the decontamination shop where objects are cleaned of radio-activity. "It all depends on the value," Furney said. "If we feel the tool or object that has become contaminated is of enough value to compensate for cleaning, then we clean it and put it back into use."

The entire area is divided into a number of fenced sections and each person going from one section to another must be checked at one of the numerous guard houses.

It is from this laboratory and others like it, that the discoveries towards methods of harnessing atomic energy are emanating. These buildings and the men working in them are not only striving to keep the United States ahead in the vital race of atomic weapons, but are also trying to learn methods of putting atomic energy to use in peaceful pursuits.

And Argonne National Laboratory has made its mark in history. From its inception when its first workable pile led to the development of the A-Bomb to the present it has led the way.

CLASSIFIED ADS *(Continued)*

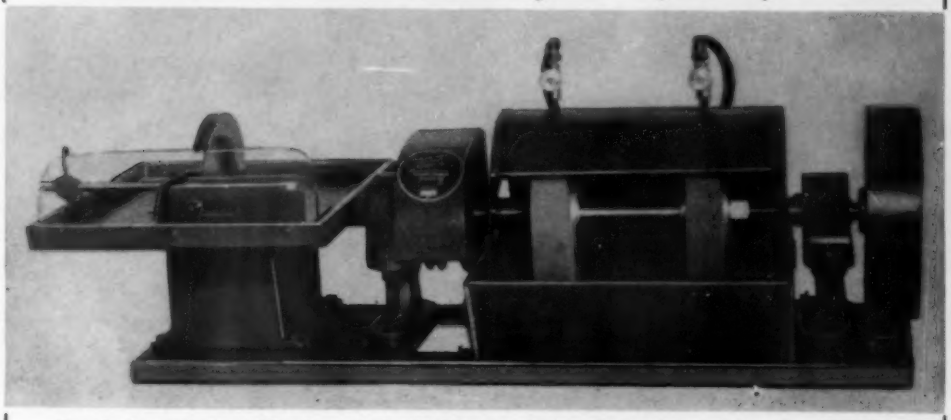
FOSSIL TRILOBITES, Ill. & Utah specimens, large size $2, medium size $1.50, small $1. These are flat. N. Carter, Elkhorn, Wis.

CUTTING MATERIAL. Agates, Poppy Jasper, Rhodonite and others. $1 lb., postage extra. Al Thrower, P.O. Box 305, Santa Cruz, Calif.

MINERAL COLLECTION for sale. 200 specimens, some fossils and fluorescents. $50. Guild, 630 Greenleaf Ave., Wilmette, Ill.

INDEX TO ADVERTISERS

COMBINATION UNIT *for Lapidary Work*



Here is the perfect combination unit for lapidary work. Handles sawing, grinding, sanding and polishing. Extremely well built for long, trouble-free service. Exceptionally quiet operation helps to make this unit a favorite.

Features and Specifications

- **Size of machine—Base 12" by 33".**
- **Shaft—1" ground and polished cold-rolled steel.**
- **Bearings—1" SKF, self-aligning, pillow block ball bearings.**
- **Unit is made of heavy cast-dural with steel hood over grinding wheels.**
- **V-Belt can be changed in seconds.**
- **Motor may be mounted under machine or in back of machine.**
- **Drains for trim saw and splash pan are located in back of machine.**
- **Leather covered buff and sanding disc can be changed in seconds.**
- **Drum sander can be used on the Model E-10 by removing sanding guard located at right of machine.**
- **Grinding wheels can be changed and replaced in a matter of seconds.**
- **Bearing supports are located on both sides of grinding wheels for added sturdiness.**

MODEL E-10 — TABLE MODEL

Furnished complete with all necessary plumbing attachments and the following equipment (motor not included):

1 — 8" by .040 Congo Diamond Blade
1 — 8" by 1½" 100-grit grinding wheel
1 — 8" by 1½" 220-grit grinding wheel
1 — 8" leather polishing buff
1 — 8" sanding disc
1 — vise with 1½" cross-feed

PRICES

Price complete with all wheels (less motor)	$139.00
Crating charge	3.00
Extra 8" Disc Sander	7.15
⅓ H.P. Motor	18.54

All prices F.O.B. Comptom, California

Shipping weight approximately 120 lbs.

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